

## NATIONAL BUREAU OF STANDARDS REPORT

1896

THE COMPLETE SOLUTIONS OF THE BALANCED INCOMPLETE BLOCK DESIGNS WITH TEN OR FEWER REPLICATIONS

by

Melicent K. Rupp

with an introduction by W. S. Connor



U. S. DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS

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Electronic Ordnance.

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**NBS PROJECT** 

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29 August 1952

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Melicent K. Rupp

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W. S. Johnon Statistical Engineering Laboratory National Applied Mathematics Laboratories



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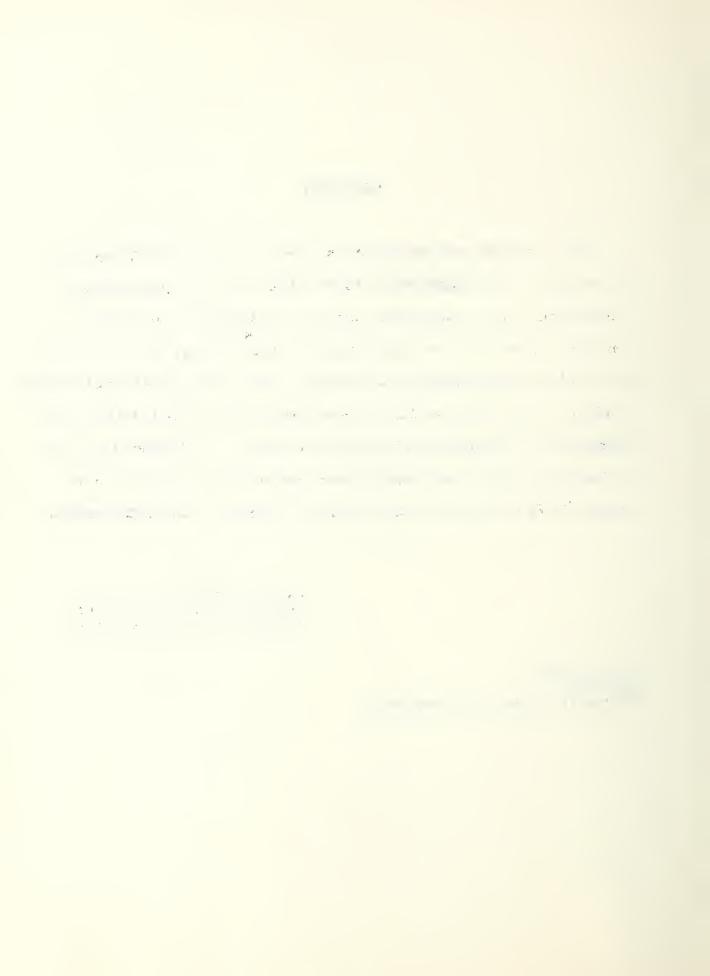


### FOREWORD

This report was prepared as part of a continuing program of research on mathematical statistics and its applications carried out at the National Bureau of Standards under the general supervision of Dr. Churchill Eisenhart, Chief of the Statistical Engineering Laboratory. The Statistical Engineering Laboratory is Section 11.3 of the National Applied Mathematics Laboratories (Division 11, National Bureau of Standards), and is concerned with the development and application of modern statistical methods in the physical sciences and engineering.

J. H. Curtiss Chief, National Applied Mathematics Laboratories

A. V. Astin Director National Bureau of Standards



bу

### W. S. Connor

In the balanced incomplete block design v variaties or treatements are compared in such a manner that each treatment is assigned to r experimental units. The units themselves are arranged into b more or less homogeneous blocks, each containing k experimental units. Any two treatments occur together in the same block times, the treatments occurring in a given block being all different. Hence the design depends on the five parameters, v, b, r, k, and A. From this definition it is easy to show that the following conditions are necessary:

$$bk = vr, r(k-1) = (v-1)\lambda$$
.

Fisher [1] also showed that for the existence of an actual combinatorial solution it is necessary that

### $b \ge v$ , or $k \le r$ .

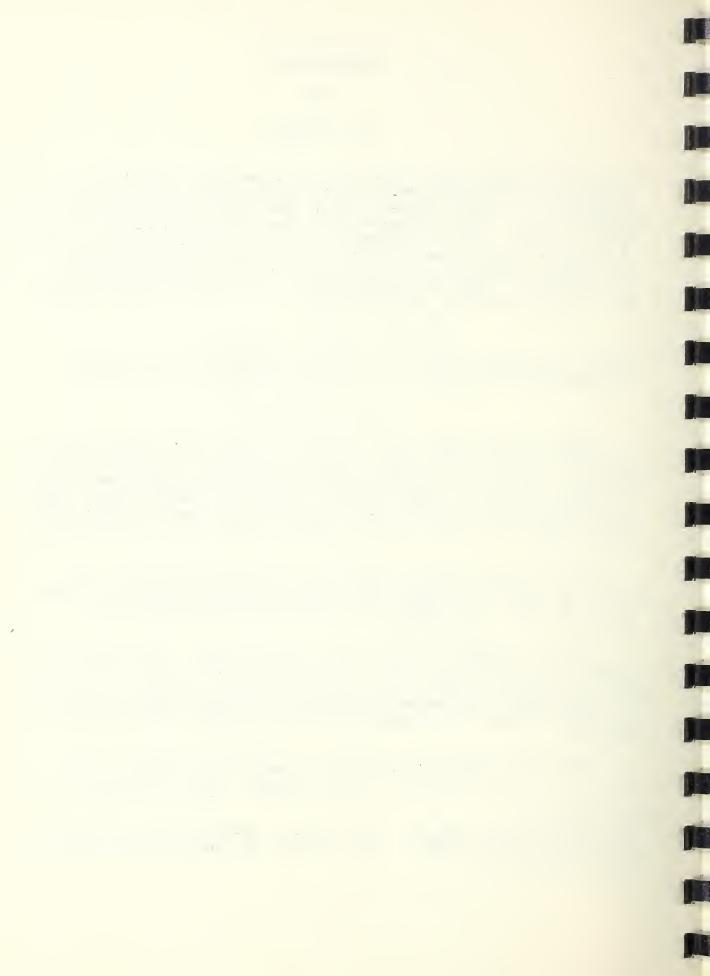
The work of Yates [2], Fisher and Yates [3], Bose [4], and Bhattacharya [5], [6], [7], provided solutions for many of these designs. Sets of parameters which satisfy the above conditions, together with brief explanations of how to construct the corresponding designs, are included in Fisher and Yates' tables [8]. All of these sets have  $r \leq 10$ , which is felt to be a practical upper limit.

The purpose of this report is to write out in full the solutions for the designs which are listed by Fisher and Yates. It is believed that making the designs more accessible will increase their usefulness.

Every solution occupies one or more pages. The reference number and parameters of the design are given at the top of the page, followed in some cases by descriptive remarks, and then by the solution. Treatments are denoted by Arabic numbers, blocks by Arabic numbers in parentheses, and replications by Roman numbers.

The index gives the reference number, \* parameters, and important characteristics of each design. These characteristics

<sup>\*</sup>No solution is known for those sets of parameters which do not carry a reference number. All but two of these designs have been proved impossible.



are abbreviated in a "Remarks" column. The abbreviations have the following meanings: "R" denotes "resolvable", which means that the blocks are divisible into groups, which have the property that every treatment occurs once in a group: "i<sub>1</sub>G:i<sub>2</sub>"; where i<sub>1</sub> and i<sub>2</sub> are positive integers, means that the blocks have been divided into i<sub>1</sub> groups, each of which contains every treatment i<sub>2</sub> times.

"Y.S." denotes "Youden Square", which means that the treatments have been arranged so that each column contains every
treatment exactly once. This kind of arrangement is always
possible when b = v. The first Youden Squares were given in [9].
"E.Y.S." denotes "extended Youden Square", and means that each
column contains every treatment is times, where is is a positive
integer, greater than one.

#### REFERENCES

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- [3] R. A. Fisher and F. Yates, <u>Statistical Tables for Biological</u>, <u>Agricultural</u>, and <u>Medical Research</u>, 1st edition, <u>Oliver and Boyd</u>, Lts., 1938.
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- [5] K. N. Bhattacharya, "A new balanced incomplete block design,"
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- [6] K. N. Bhattacharya, "On a new symmetrical balanced incomplete block design," Bull. Calcutta Math. Soc., Vol.36, (1944) pp.91-96.
- [7] K. N. Bhattacharya, "A new solution in balanced incomplete block design," Sankhya, Vol.7, (1946), pp.423-424.
- [8] R. A. Fisher and F. Yates, Statistical Tables for Biological,
  Agricultural, and Medical Research, Oliver and Boyd, Ltd.
  1949.
- [9] W. J. Youden, "Use of incomplete block replications in estimating tobacco-mosaic virus," Contributions from the Boyce Thompson Institute, Vol. 9, (1937), pp.41-48.



1. k b v r 1 2 6 4 3 1

Rep.	Blks	Tr	2
I	(1) (2)	1 2 3 L	2
II	(3) (4)	1 3	} <del> </del>
III	(5) (6)	1 1 2 3	1



2. k b v r \ \ 2 10 5 4 1

2 groups; each contains 2 replications; extended Youden Square

Rep.	Blk.	T	0
I	(1) (2) (3) (4) (5)	12345	25413
II	(6) (7) (8) (9) (10)	1 2 3 4 5	34251



3. k b v r  $\lambda$  2 15 6 5 1

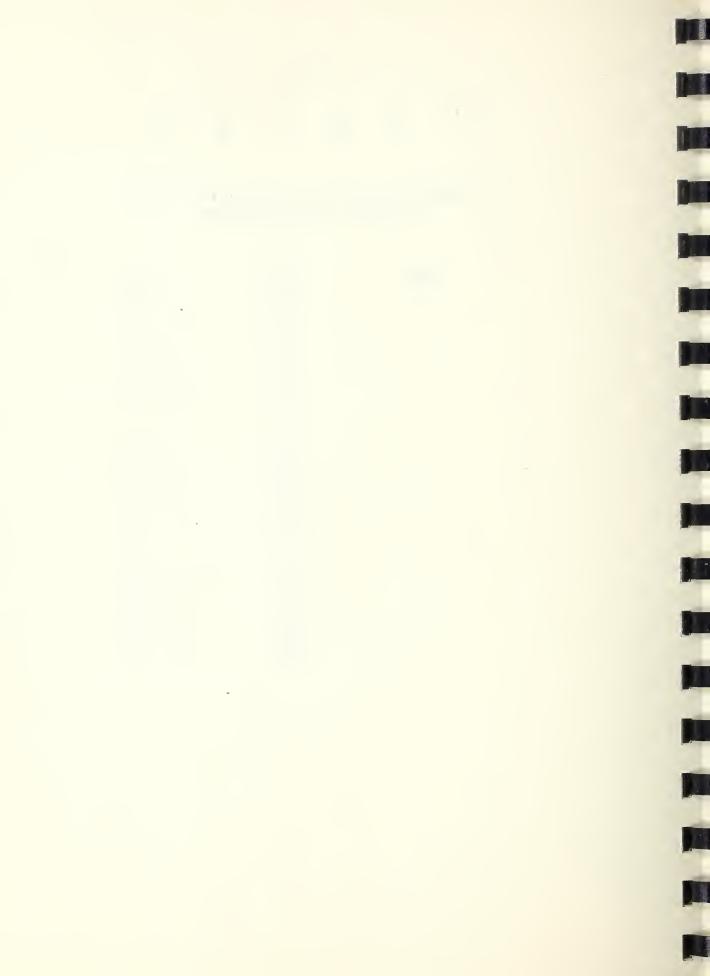
Rep.	Blke	Tre
I	(1) (2) (3)	1 2 4 6 3 5
II	(4) (5) (6)	1 3 2 6 4 5
III	(7) (8) (9)	1 4 2 3 5
IV	(10) (11) (12)	1 5 2 4 3 6
V	(13) (14) (15)	1 6 2 5 3 4



4. k b v r \(\lambda\)
2 21 7 6 1

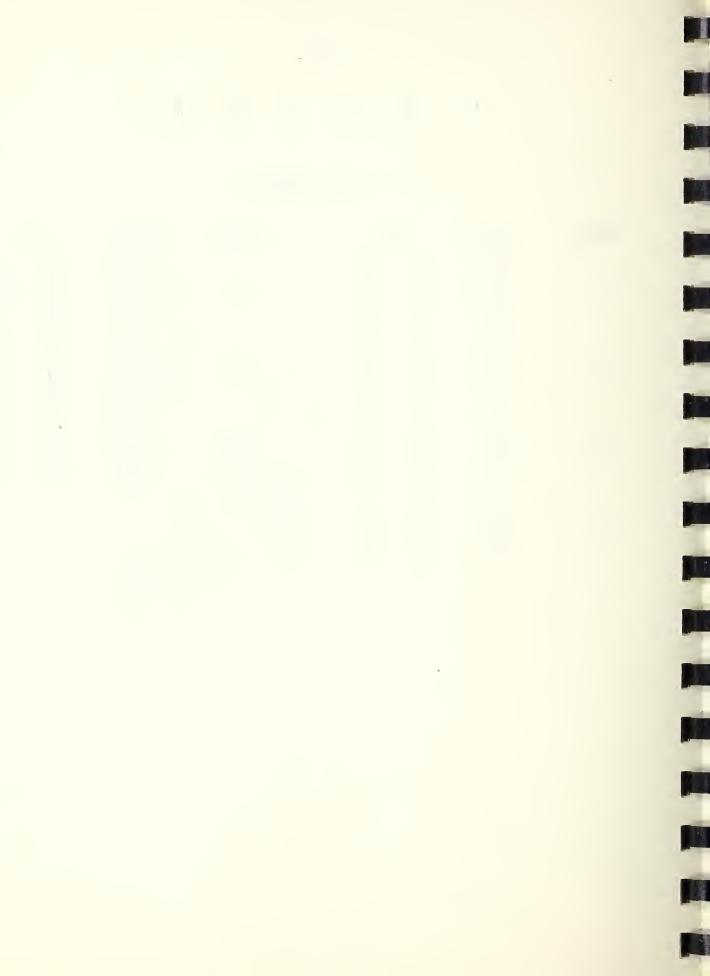
# 3 groups; each contains 2 replications; extended Youden Square

Rep.	Blk.	Tr
I	(1) (2) (3) (4) (5) (6) (7)	1 2 6 4 7 1 5 3 4 5 6 7
II	(8) (9) (10) (11) (12) (13) (14)	123456712
III	(15) (16) (17) (18) (19) (20) (21)	1234567



# 5. k b v r 1

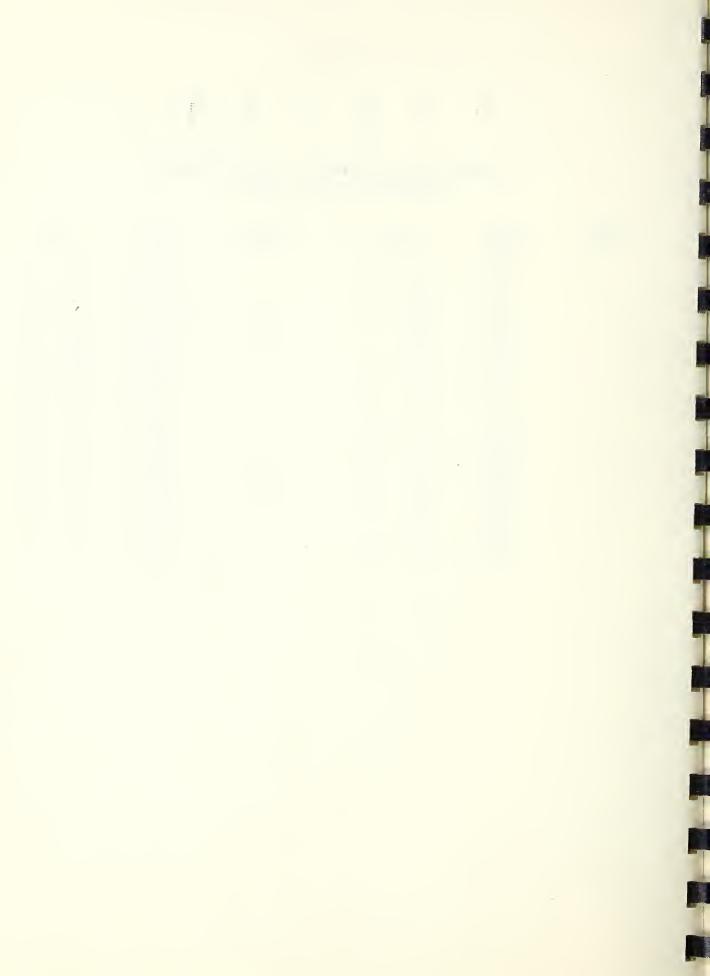
Rep.	Blk.	$\underline{\mathbf{r}}$	r.	Rep.	Blk.	Tr	0
I	(1) (2) (3) (4)	1 3 5 6	2487	V	(17) (18) (19) (20)	1 2 3 4	6 5 8 7
II	(5) (6) (7) (8)	1245	3867	VI	(21) (22) (23) (24)	1 2 3 4	7658
III	(9) (10) (11) (12)	1 2 5 7	368	AII	(25) (26) (27) (28)	1 2 3 4	8 7 6 5
IV	(13) (14) (15) (16)	1 2 3 6	5 4 7 8				



6. k b v r 1 2 36 9 8 1

## 4 groups; each contains 2 replications; Extended Youden Square

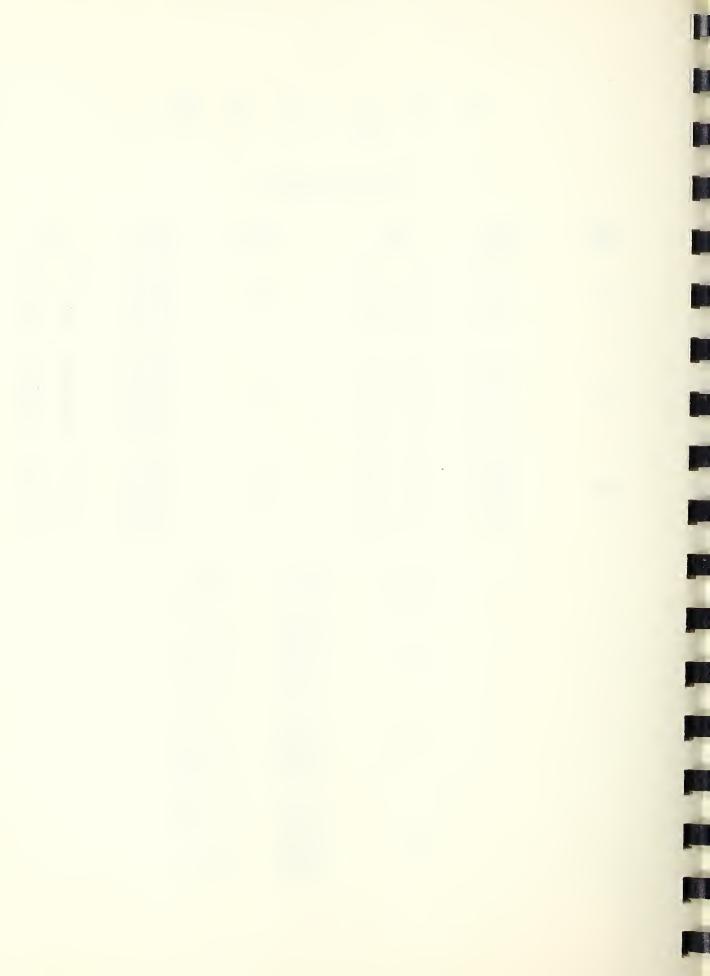
Rep.	Blk.	Tr.	Rep.	Blk.	Tr.
I	(1) (2) (3) (4) (5) (6) (7) (8)	123456789	III	(19) (20) (21) (22) (23) (24) (25) (26) (27)	12345678913
II	(10) (11) (12) (13) (14) (15) (16) (17) (18)	356987142	IV	(28) (29) (30) (31) (32) (33) (34) (35) (36)	123456789 1



# 7. k b v r $\lambda$ 2 45 10 9 1

Rep.	Blk.	Tr.	Rep	Blk.	Tr.
I	(1) (2) (3) (4) (5)	1 2 3 4 5 7 6 10 8 9	IV	(16) (17) (18) (19) (20)	1 5 2 4 3 9 7 10 6 8
II	(6) (7) (8) (9) (10)	1 3 2 10 4 5 7 8 6 9	v	(21) (22) (23) (24) (25)	1 6 2 5 3 10 4 8 7 9
III	(11) (12) (13) (14) (15)	1 4 2 3 5 8 6 7 9 10	VI	(26) (27) (28) (29) (30)	1 7 2 6 5 9 8 10

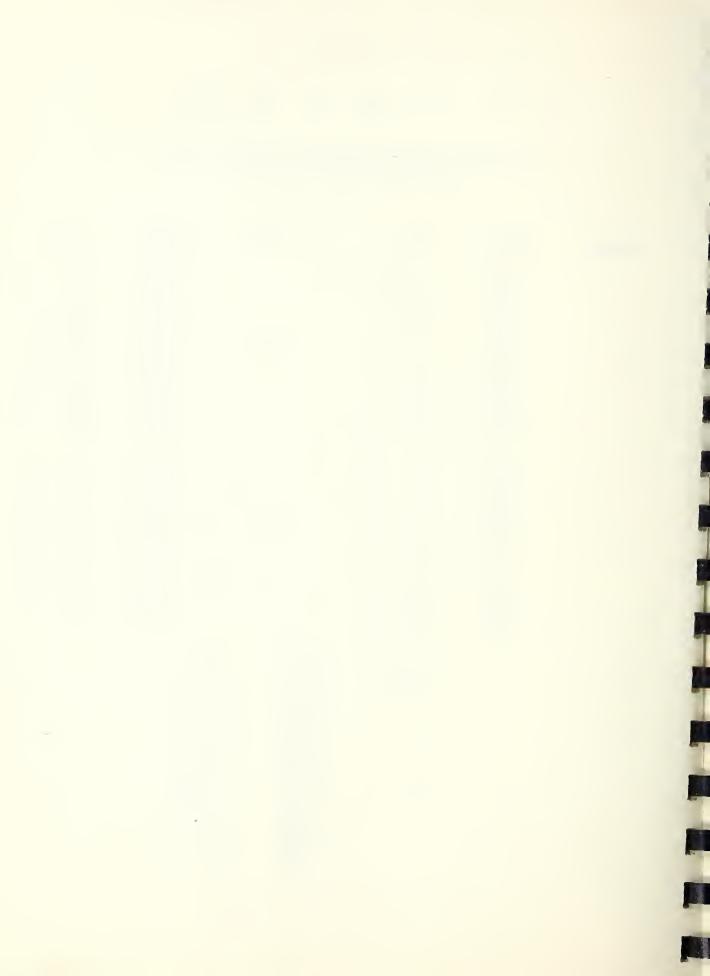
Rep.	Blk.	Tr.
VII	(31) (32) (33) (34) (35)	1 8 2 7 3 6 4 10 5 9
VIII	(36) (37) (38) (39) (40)	1 9 2 8 3 7 4 6 5 10
IX	(41) (42) (43) (44) (45)	1 10 2 9 3 8 4 7 5 6



## 5 groups; each contains 2 replications; Extended Youden Square

Rep.	Blk.	Tro	Rep.	Blk.	Tr.
I	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)	1 2 11 3 10 5 6 7 1 3 4 9 8 10 11	III	(23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33)	1 4 3 7 4 5 6 10 7 11 8 9 10 8 11 5
II	(12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22)	1 3 6 5 7 9 8 2 1 7 10 11 4	IV	(34) (35) (36) (37) (38) - (39) (40) (41) (42) (43) (44)	1 5 9 6 2 7 6 10 7 8 4 11 10 11 3

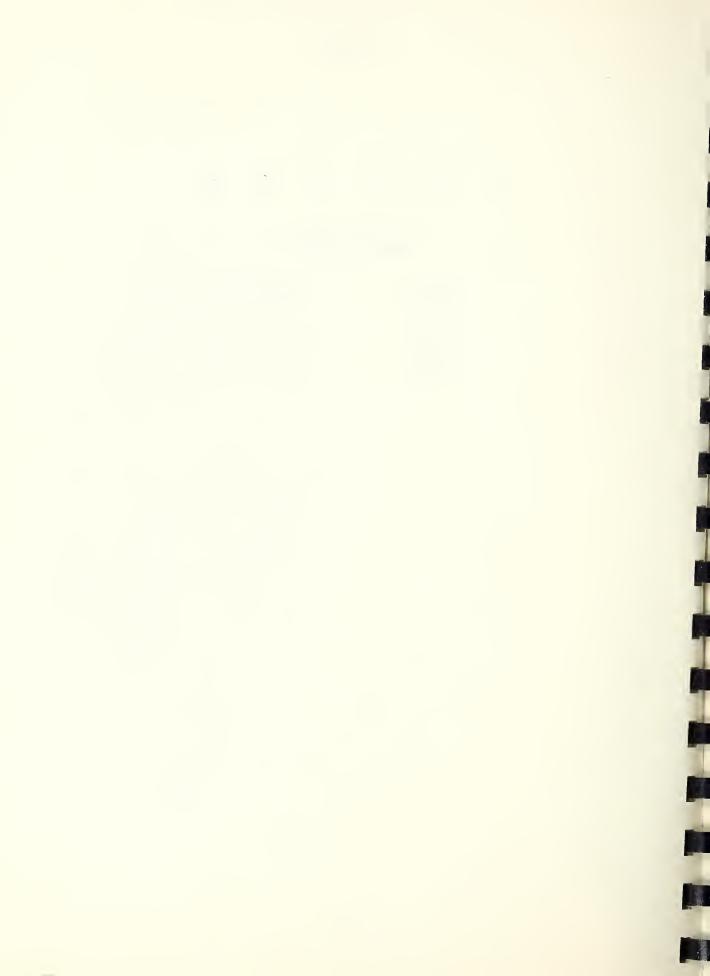
Rep.	Blk.	Tr.
V	(45) (46) (48) (49) (50) (51) (53) (54) (55)	1 6 5 4 7 8 1 1 1 9 3 2 1 1 1



9.	k	Ъ	V	r	λ
	-3	4	4	3	2

## Youden Square

Block	Tr	eatme	
(1)	1	2	3412
(2)	2	3	
(3)	3	4	
(4)	4	1	



10.	k	b	v	r	2
	3	7	7	3	1

# Youden Square

Block	Treatment			
(1) (2) (3) (4) (5) (6) (7)	1234567	3 1 7 5 6 2 4	6523741	



11.	k	ъ	V	r	l
	3	10	5	6	3

## 2 groups; each contains 3 replications; Extended Youden Square

Rep.	Blk.	Tr.
I	(1) (2) (3) (4) (5)	1 2 3 2 1 5 3 4 2 4 5 1 5 3 4
II	(6) (7) (8) (9) (10)	1 2 4 2 3 5 3 4 1 4 5 2 5 1 3



12.	k	ъ	v	r	2
	3	10	6	5	2

Block	Tr	Treatment			
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	1235564156	4446611223	5654232334		



13.	k	Ъ	v	r	λ
	3	12	9	4	1

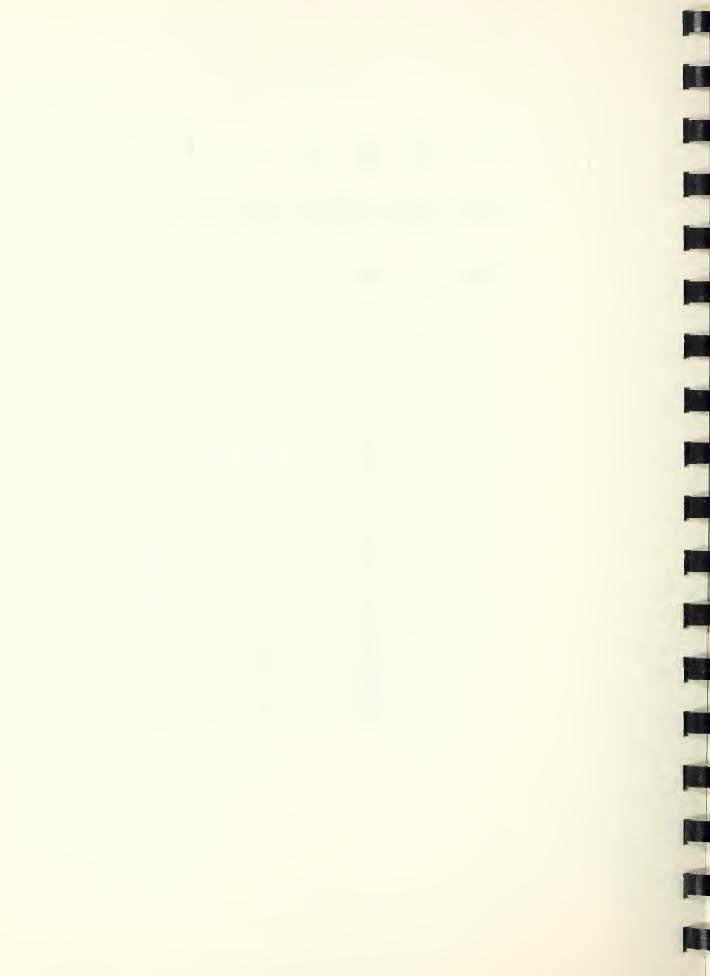
Rep.	Blk.		Tr.	
I	(1) (2) (3)	47	2 5 8	3 6 9
II	(4) (5) (6)	1 2 3	456	7 8 9
III	(7) (8) <del>(9</del> )	1 2 3	6 4 5	8 9 7
IV	(10) (11) (12)	2 3	5 6 4	9 7 8



14. k b v r  $\lambda$  3 26 13 6 1

#### 2 groups; each contains 3 replications; Extended Youden Square

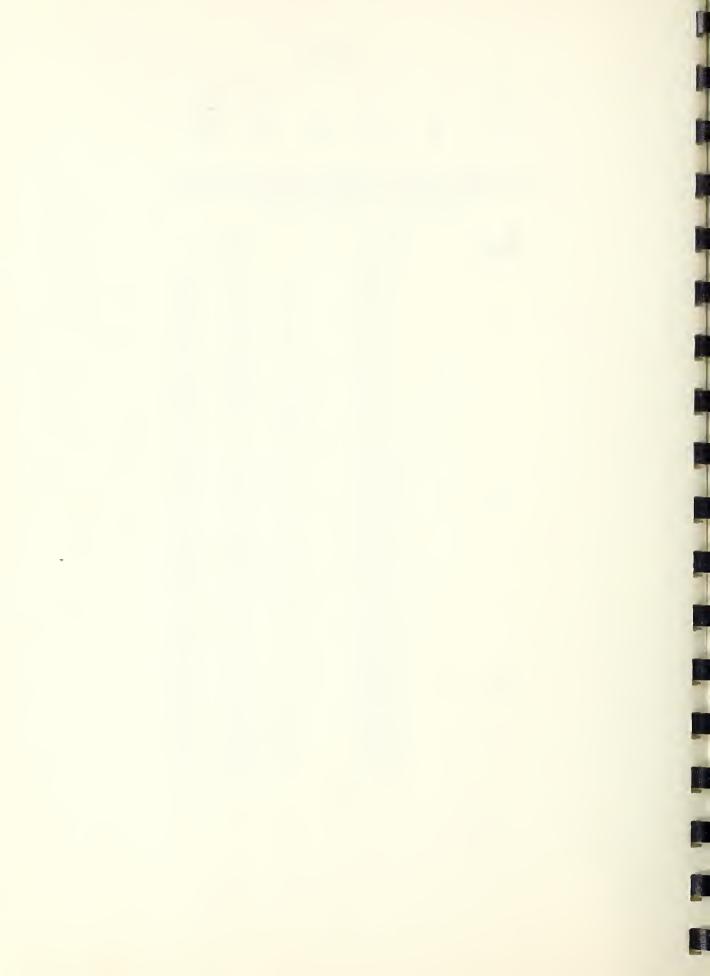
Rep.	Blk.	Tr.
I	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)	1 3 9 2 4 10 3 5 11 4 6 12 5 7 13 6 8 1 7 9 2 8 10 3 9 11 4 10 12 5 11 13 6 12 1 7 13 2
II	(14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26)	2 6 5 3 7 6 4 8 7 5 9 8 6 10 9 7 11 10 8 12 11 9 13 12 10 1 13 11 2 1 12 3 2 13 4 3 1



15. k b v r 2
3 30 10 9 2

#### 3 groups; each contains 3 replications; Extended Youden Square

Rep.	Blk.	Tr.
I	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	1 2 3 8 4 7 4 6 7 8 4 9 7 8 9 10 2 9 10 5
II	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)	1 2 4 2 3 6 3 4 8 4 9 5 7 1 6 8 9 7 10 3 8 1 10 9 5 7
III	(21) (22) (23) (24) (25) (26) (27) (28) (29) (30)	1 3 5 6 9 10 3 4 6 3 4 5 6 1 8 7 9 4 7 9 10 5



16.	k	ъ	V	r	<b>7</b>
	3	35	15	7	ì

Rep.	Blk.		Tr.		Rep.	Blk.		<u>Tr.</u>	
I	(1) (2) (3) (4) (5)	1 4 5 6 7	2 8 10 11 9	3 12 15 13 14	v	(21) (22) (23) (24) (25)	1 2 3 4 7	10 12 5 9	11 14 6 13 15
II	(6) (7) (8) (9) (10)	1 2 3 6 7	4 8 13 9 11	5 10 14 15 12	VI	(26) (27) (28) (29) (30)	1 2 3 4 6	12 5 9 11 8	13 7 10 15 14
III	(11) (12) (13) (14) (15)	1 2 3 4 5	6 9 12 10 8	7 11 15 14 13	VII	(31) (32) (33) (34) (35)	1 2 3 7	14 8 9 10	15 6 11 12 13
IV	(16) (17) (18) (19) (20)	1 2 3 5 6	8 13 4 11 10	9 15 7 14 12					



17. k b v r  $\lambda$  3 57 19 9 1

#### 3 groups; each contains 3 replications; Extended Youden Square

Rep.	Blk.	Tr	•	Rep.	Blk.		Tr.	
I	(1) (2) (3) (4) (5) (6) (7) (10) (11) (12) (12) (14) (15) (16) (18) (19)	1	11 12 13 14 15 16 17 18 19 12 3 45 6 7 8 9 10	III	(39) (412) (4434) (4456) (4456) (45513) (5557) (5567)	4567890 11231456 17819 123	6 78 90 112 1345 16 178 912 345	9 10 11 12 14 15 16 17 18 19 12 3 4 5 6 7 8
II	(20) (21) (22) (23) (24) (25) (26) (28) (28) (31) (32) (33) (34) (35) (36) (37) (38)	2 3 4 5 6 7 7 8 9 10 10 11 11 12 12 13 14 15 16 17 17 18 19 19	145 167 189 123 4567 890 112 13					



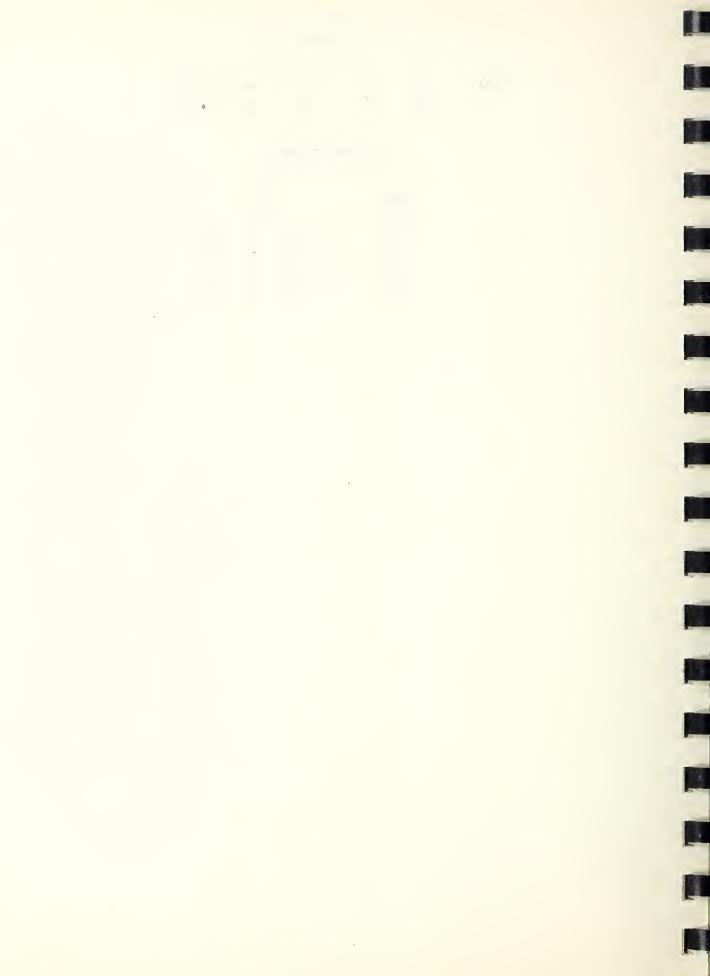
# 18. k b v r $\lambda$ 3 70 21 10 1

Rep.	Blk.	Tr.		Rep.	Blk.		Tr.	
ī	(1) (2) (3) (4) (5) (6) (7)	1 2 4 5 7 8 10 11 13 14 16 17 19 20	3 6 9 12 15 18 21	VI	(36) (37) (38) (39) (40) (41) (42)	1234567	8 18 15 12 9 11	10 19 17 16 21 14 20
ΊΙ	(8) (9) (10) (11) (12) (13) (14)	1 4 2 5 3 9 6 17 7 12 8 13 10 14	15 11 16 20 19 18 21	VII	(43) (44) (45) (46) (47) (48) (49)	1 2 3 4 6 7 8	11 10 5 9 16 14 15	18 20 12 13 21 17
III	(15) (16) (17) (18) (19) (20) (21)	1 5 2 4 3 7 6 10 8 16 9 15 12 13	17 14 11 19 20 18 21	VIII	(50) (51) (52) (53) (54) (55) (56)	12345911	12 6 14 18 7 10 13	20 8 19 21 15 17 16
IV	(22) (23) (24) (25) (26) (27) (28)	1 6 2 7 3 8 4 17 5 10 11 15 12 14	9 16 21 19 13 20 18	IX	(57) (58) (59) (60) (61) (62) (63)	1 2 3 5 6 10 11	13 9 4 8 7 15 17	19 12 20 14 18 16 21
V	(29) (30) (31) (32) (33) (34) (35)	2 13	21 17 18 11 19 15 20	x	(64) (65) (66) (67) (68) (69) (70)	1234589	14 15 6 7 18 12	16 21 13 10 20 17



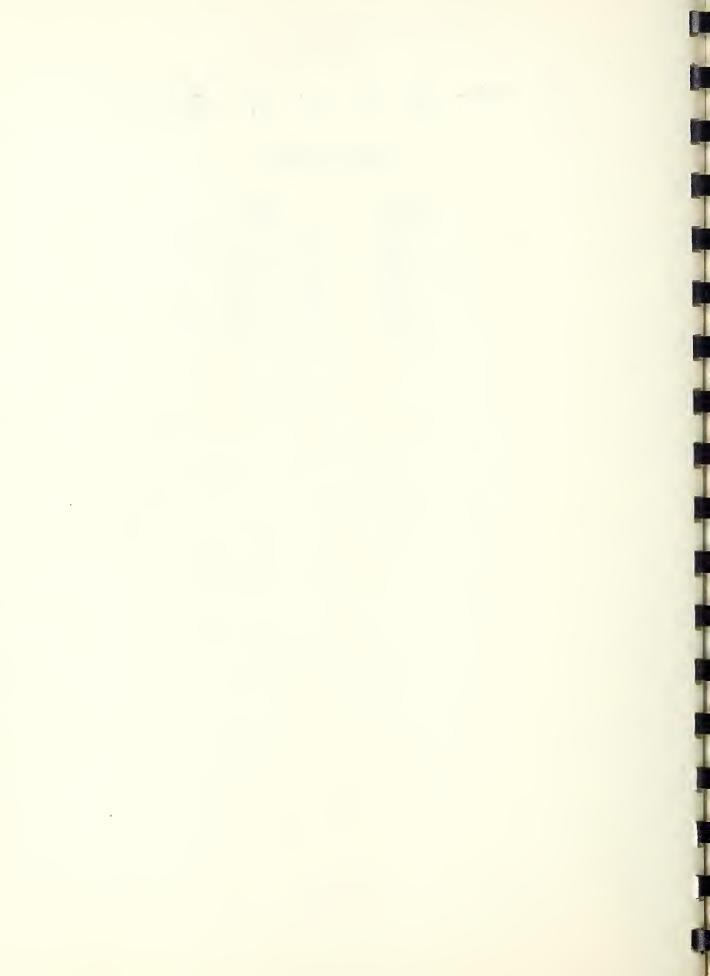
19. k b v r 3

Blk.		1	lr.	
(1) (2) (3) (4) (5)	12345	23451	34512	45123



20. k b v r  $\lambda$  7 7 4 2

Blk.		T	? •	
(1) (2) (3) (4) (5) (6) (7)	1 2 3 4 5 6 7	2465731	3756142	4521376



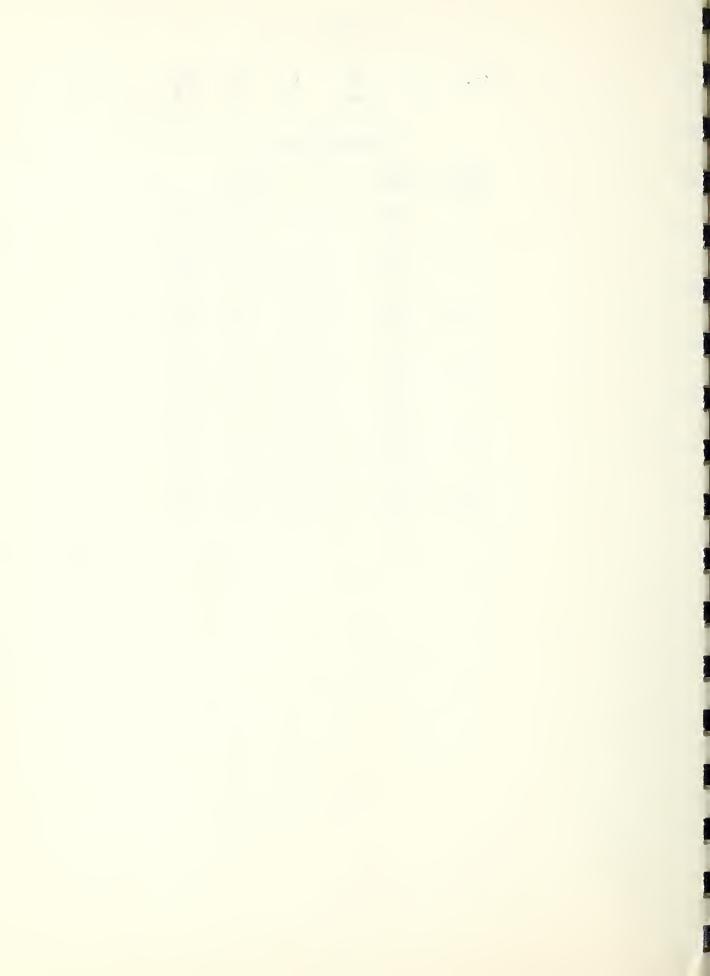
21. k b v r  $\lambda$  13 13 4 1

Blk.			Tr.	
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)	1 3 4 5 6 7 8 9 10 11 12 13	2 6 13 7 11 4 3 1 12 8 9 10 5	3 13 4 18 10 5 12 2 7 6 11 9	10 7 8 11 2 5 12 6 4 9 3 13 1



22.	k	b	v	r	λ
	4	14	8	7	3

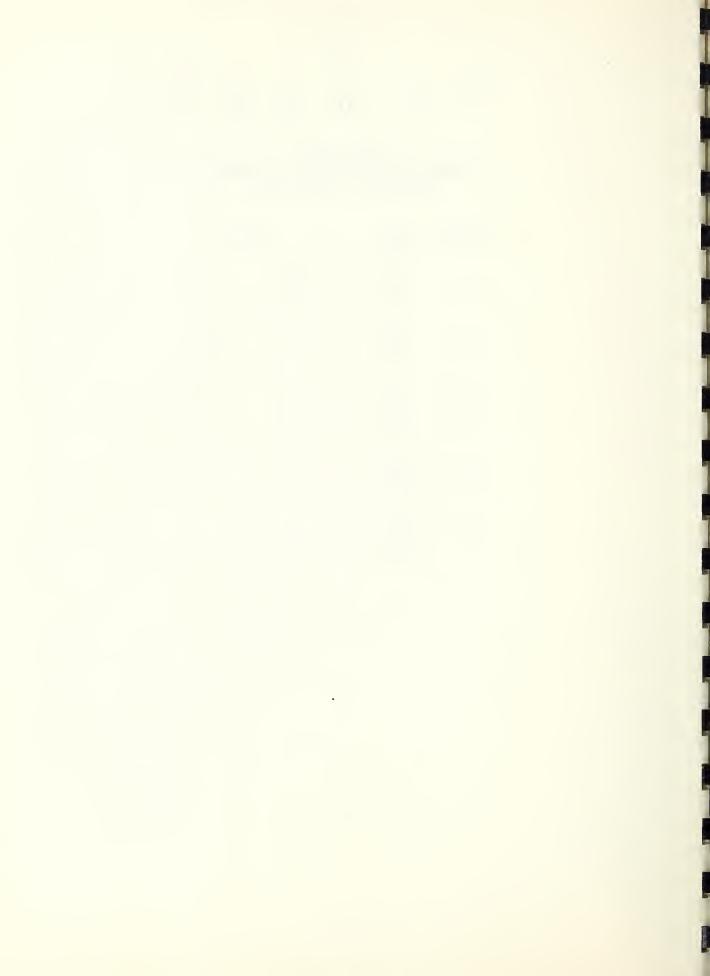
Rep.	Blk.		Ţ	r.	
I	(1) (2)	5	2 6	3	4 8
II	(3) (4)	1	2	7 5	8
III	(5) (6)	2	3 4	6 5	8
IV	(7) (8)	1 2	43	6 5	<b>7</b>
V	(9) (10)	3	2 4	5	6 8 <sup>,</sup>
VI	(11) (12)	. 2	3 4	5	<b>7</b>
VII	(13) (14)	1 2	4	5 6	8 7



23. k b v r  $\lambda$  4 15 6 10 6

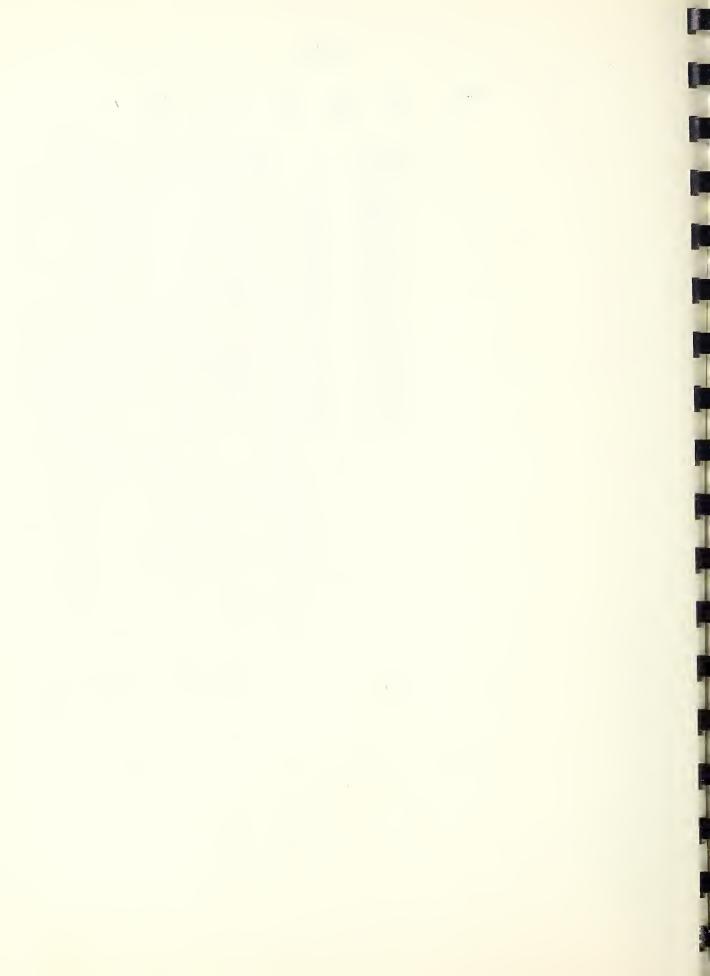
5 groups; each contains 2 replications, which are separable.

Rep.	Blk.			Tr.	
I	(1) (2) (3)	1 3 5	2 4 6	3 5 1	4 6 2
II	(4) (5) (6)	1 3 5	246	3 1 2	564
III	(7) (8) (9)	1 3 5	2 4 6	3 2 1	6 5 4
IA	(10) (11) (12)	1 3 5	2 4 6	4 2 1	563
V	(13) (14) (15)	1 3 5	2 4 6	4 1 2	6 5 3



24. k b v r \(\lambda\)
4 15 10 6 2

Blk.	-	ا	Tr.	
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13) (14) (15)	111223456758890	234334267569908	567547978904021	8 9 10 10 68 1 12 3 4 5 6 7 3



25. k b v r  $\lambda$  18 9 8 3

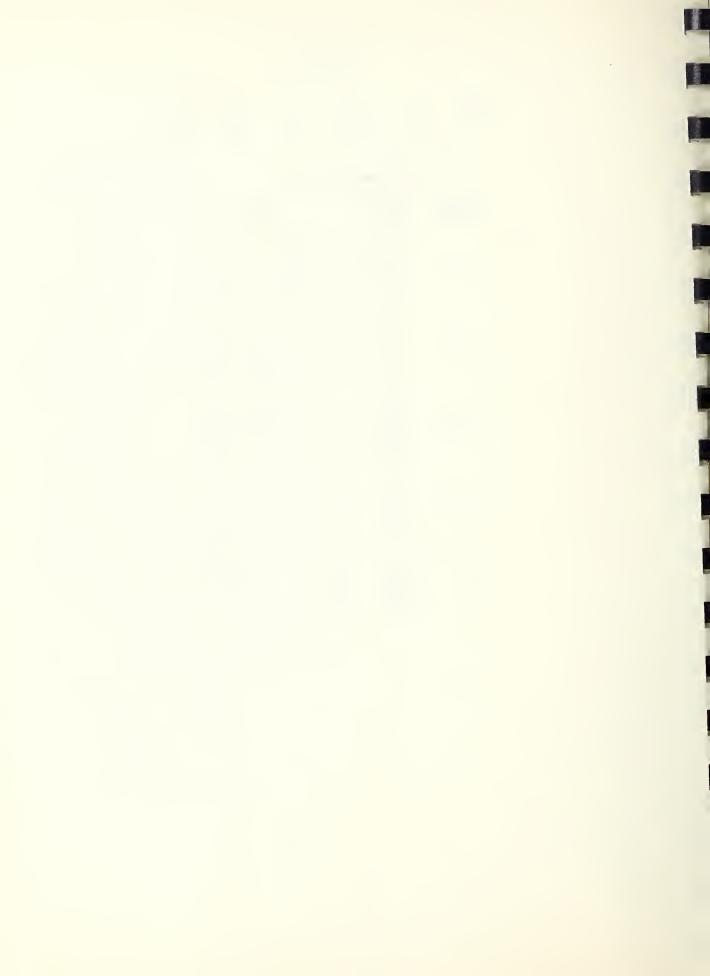
2 groups; each contains 4 replications; Extended Youden Square.

Blk.			Pro	
(1) (2) (3) (4) (5) (6) (7) (8) (9)	123456789	468179325	68 93 142 57	791285643
(10) (11) (12) (13) (14) (15) (16) (17) (18)	123456789	234918657	567291438	759163842



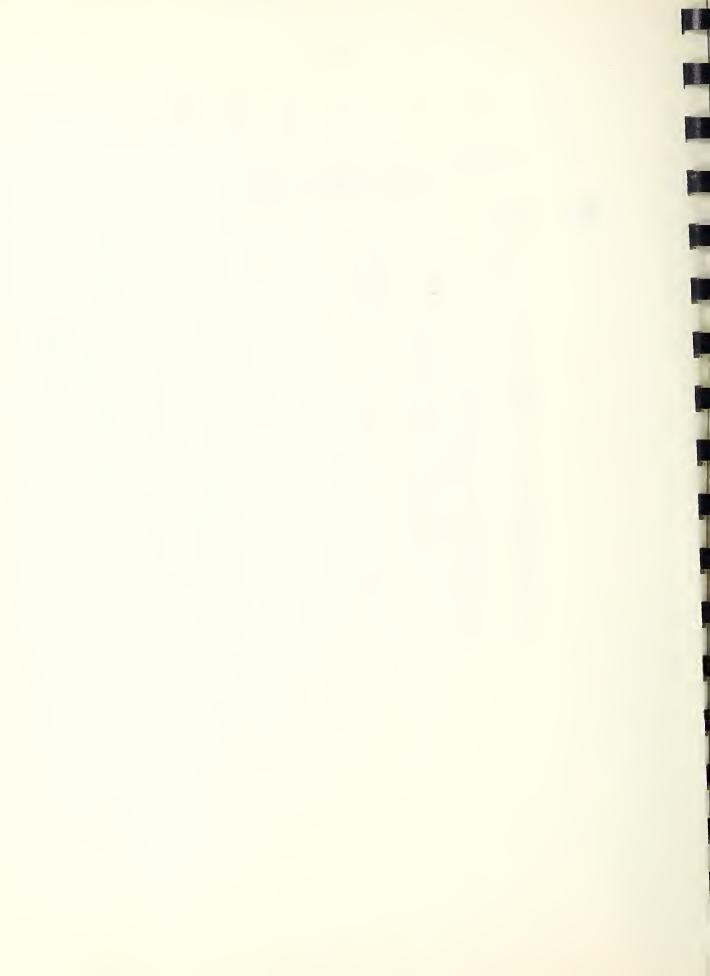
26. k b v r  $\lambda$  20 16 5 1

4 8 12 16
13 14 15 16
16 15 14 13
14 13 16 15
15 16 13 14



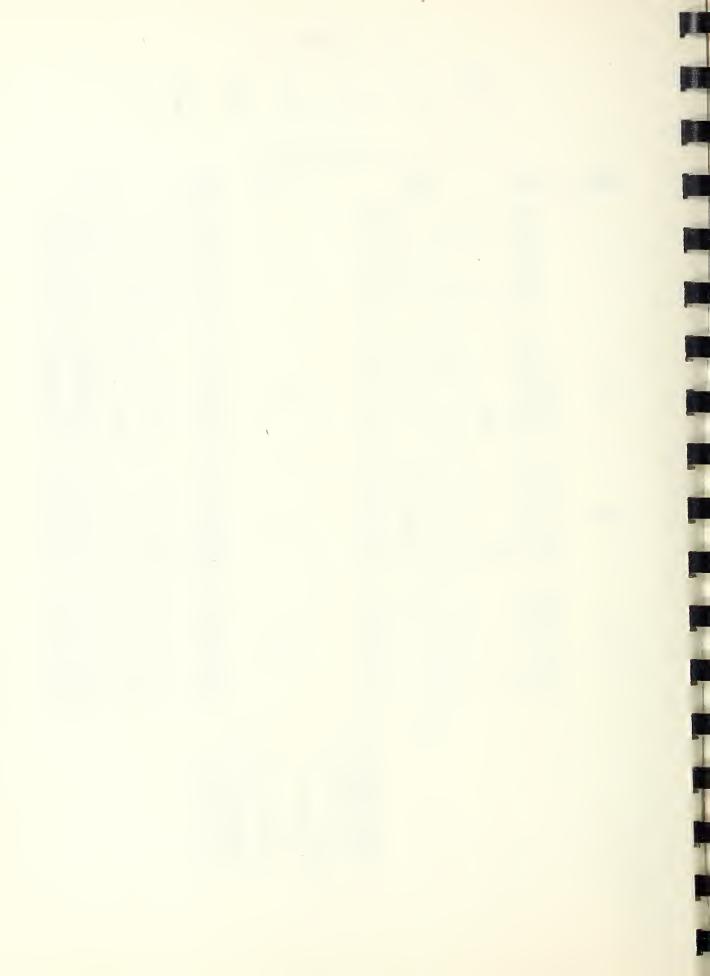
#### 2 groups; each contains 4 replications Extended Youden Square

Rep.	Blk.	Tr e	Rep.	Blk.	f 2	Ir.
I	(1) (2) (3) (45) (6) (10) (112) (12) (13) (145) (147) (15) (122) (123) (	1 2 6 25 2 3 7 21 3 4 8 22 4 5 9 23 4 5 1 10 6 7 11 7 8 12 1 8 9 13 4 10 6 15 1 11 12 16 10 12 13 17 13 14 18 7 14 15 19 8 15 11 20 9 16 17 21 15 17 18 22 11 18 19 23 12 17 18 23 12 18 19 20 24 13 20 26 25 14 21 22 23 24 4 18 22 23 24 5 19	II	(26) (278) (2289) (33334) (333378) (444478) (44478) (44478) (44478) (4478) (4478) (4478) (4478) (4478)	345128 906 7345128 90 6 734512128 122 223 223 223 223 223 23 23 23 23 23 23	11 19 16 17 18 17 15 16 78 19 10 13 14 15 12 22 23 45 12 3 9 10 6 7 8 11 12 13 15 16 7 8 9 10



28. k b v r  $\lambda$  4 63 28 9 1

Rep.	Blk.		T	r.		R	ep.	Blk.		Tr o	
I	(1) (2) (3) (4) (5) (6) (7)	1 2 4 5 6 3 1 4	3 11 9 8 7 18 17	23 20 15 10 22 24 19	26 28 16 12 27 25 21	V		(29) (30) (31) (32) (33) (34) (35)	1 2 3 7 8 10 11	6 5 4 9 17 15 14	12 13 16 18 19 24 20 23 26 28 21 22 25 27
II	(8) (9) (10) (11) (12) (13) (14)	1 3 4 5 6 4 5 1 1 5	2 12 8 7 9 16 18	24 21 23 13 10 22 19	27 28 25 17 11 26 20	V	Ī	(36) (37) (38) (39) (40) (41) (42)	1245635 135	10 3 7 9 8 16 17	19 28 22 25 11 12 24 26 14 18 20 21 23 27
III	(15) (16) (17) (18) (19) (20) (21)	1 2 3 7 8 10 12	46569314	17 21 11 25 19 26 20	18 23 15 28 22 27 24	V	II	(43) (44) (45) (46) (47) (48) (49)	1 2 3 4 5 10 11	7 9 8 13 6 16 18	14 15 12 17 20 27 22 28 19 25 23 24 21 26
IV	(22) (23) (24) (25) (26) (27) (28)	1 2 3 7 9 11 12	546 8 18 13	20 10 16 21 27 19 25	22 14 17 24 28 23 26	V	III	(50) (51) (52) (53) (54) (55) (56)	1 2 3 4 6 10 12	8 7 9 5 5 17 18	11 16 19 26 13 14 21 27 24 28 20 25 22 23
			R	ер.	Blk.		T	r.			
			I	X	(57) (58) (59) (60) (61) (62) (63)	1 2 3 4 5 11 12	9 8 7 6 14 17 16	21 25 13 15 10 18 20 26 23 28 22 24 19 27			



29. k b v r  $\lambda$  5 6 6 5 4

Blk.			Tr.		
(1) (2) (3) (4) (5) (6)	123456	234561	345612	456123	561234



30. k b v r  $\lambda$  5 11 11 5 2

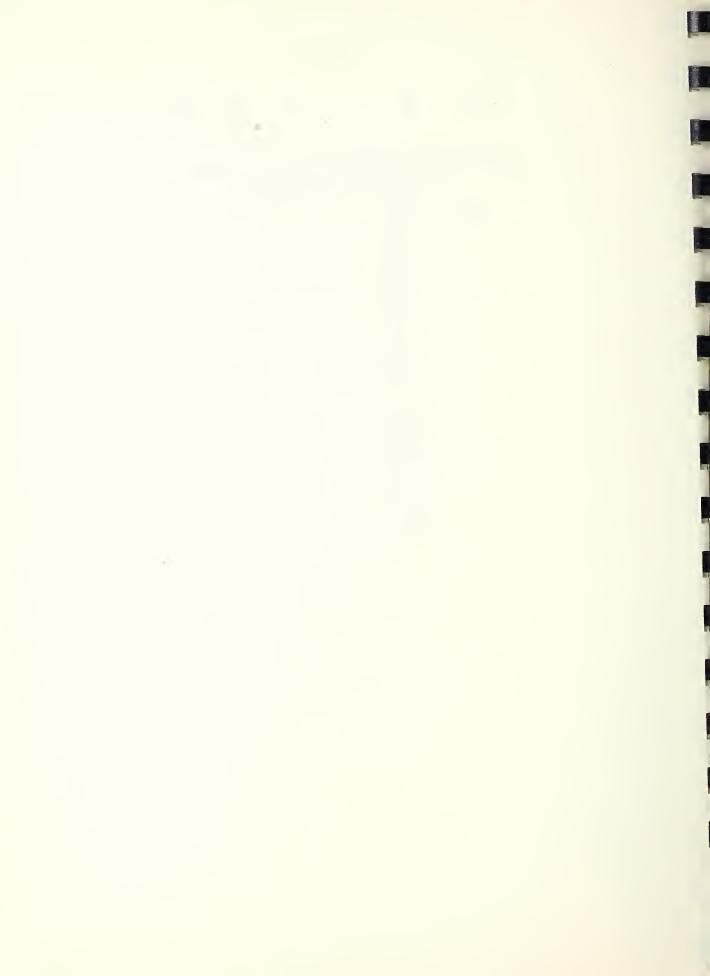
Blk.	Tr.
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11)	1 5 6 7 9 2 8 7 6 10 3 6 10 11 1 4 7 11 1 2 5 11 4 8 6 6 9 3 2 4 7 4 5 10 3 8 1 2 3 5 9 10 1 4 8 10 2 9 5 11 11 3 8 9 7



31. k b v r \\ 5 18 9 10 5

2 groups; each contains 5 replications; Extended Youden Square.

Rep.	Blk.			Tr.		
I	(1) (2) (3) (4) (5) (6) (7) (8)	123456789	268314957	385972146	749235618	812647395
II	(10) (11) (12) (13) (14) (15) (16) (17) (18)	123456789	265378491	351297846	514823967	986745132



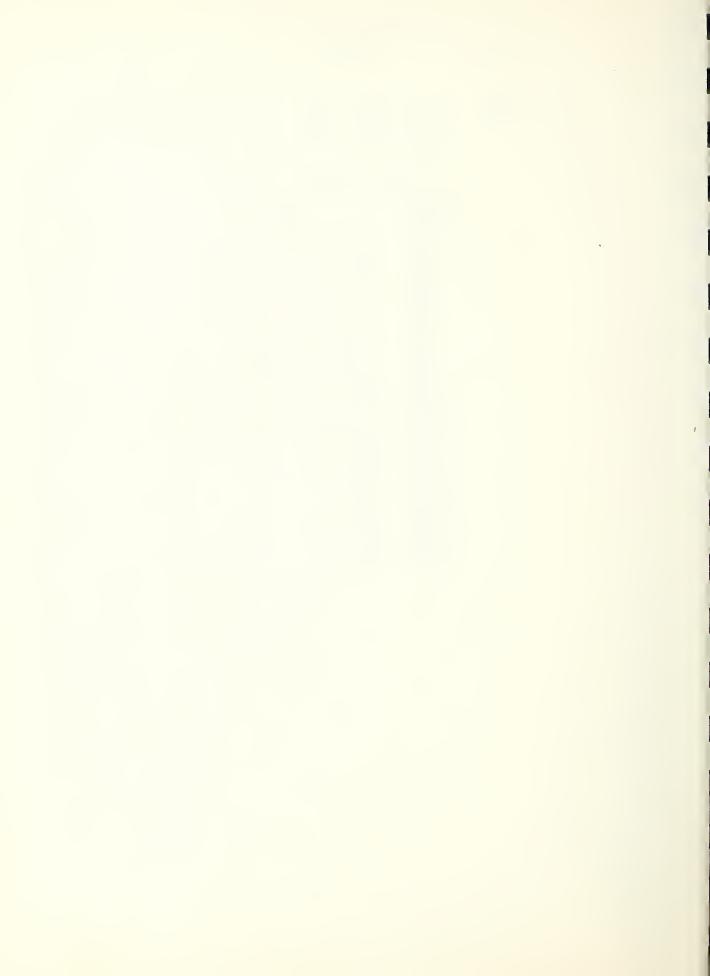
32.	k	ъ	v	r	λ
	5	18	10	9	4

Blk.			Tr.	•	
(1) (2) (3) (4) (5) (7) (8) (12) (12) (12) (14) (15) (17) (18)	132343434656787890	243455565778909021	364566677889011132	578978908990132254	78 90 10 11 22 10 23 4 4 5 6 6



33. k b v r λ 5 21 21 5 1

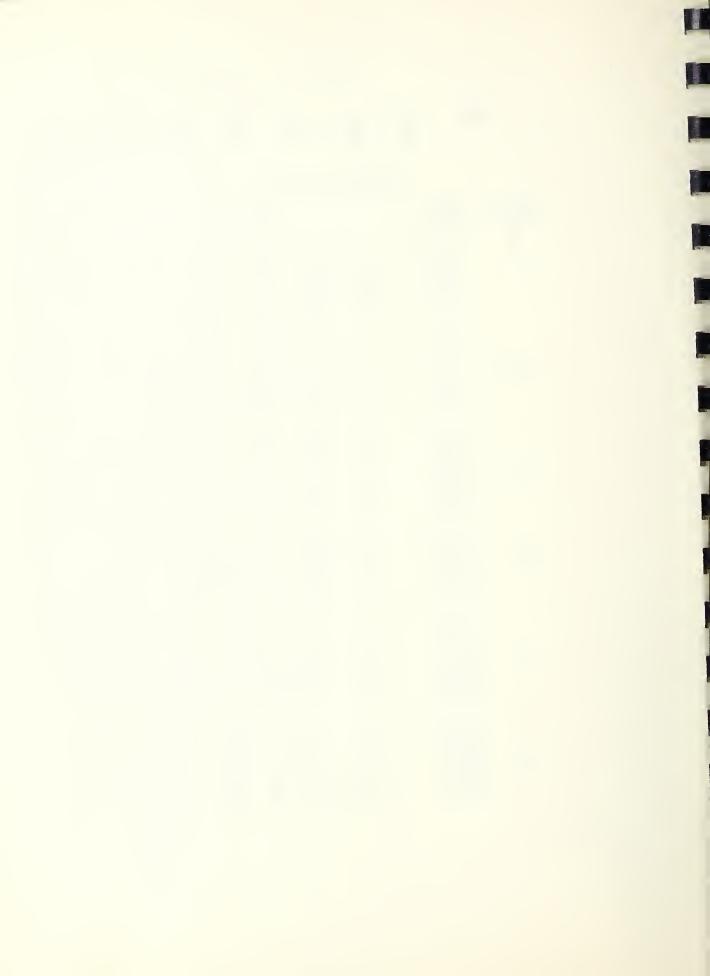
Blk.			Tr.		
(1) (2) (3) (45) (6) (7) (10) (12) (13) (14) (15) (17) (18) (19) (19) (19) (21)	123456789012345678901 123456789012345678901	253789216812441167005391	351213616851721782140911 10	496017122139512086317458	17 12 21 19 76 94 11 14 20 2 10 13 58 6 15



34.	k	Ъ	V	r	λ
•	5	30	25	6	入

# 6 Replications

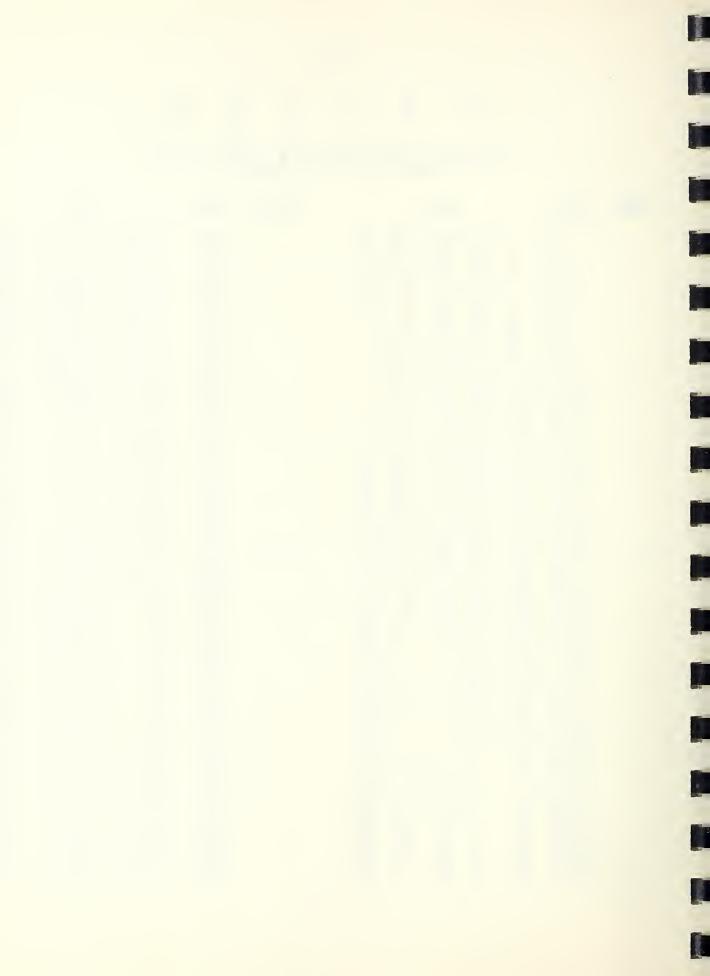
Rep.	Blk.			Tr.		
I	(1) (2) (3) (4) (5)	1 6 11 16 21	2 7 12 17 22	3 8 13 18 23	4 9 14 19 24	5 10 15 20 25
II	(6) (7) (8) (9) (10)	1 2 3 4 5	6 7 8 9	11 12 13 14 15	16 17 18 19 20	21 22 23 24 25
III	(11) (12) (13) (14) (15)	12345	10 6 7 8 9	14 15 11 12 13	18 19 20 16 17	22 23 24 25 21
IV	(16) (17) (18) (19) (20)	1 2 3 4 5	9 10 6 7 8	12 13 14 15	20 16 17 18 19	23 24 25 21 22
V	(21) (22) (23) (24) (25)	1 2 3 4 5	8 9 10 6 7	15 11 12 13 14	17 18 19 20 16	24 25 21 22 23
VI ·	(26) (27) (28) (29) (30)	12345	7 8 9 10 6	13 14 15 11 12	19 20 16 17 18	25 21 22 23 24



35. k b v r \(\lambda\) 5 82 41 10 1

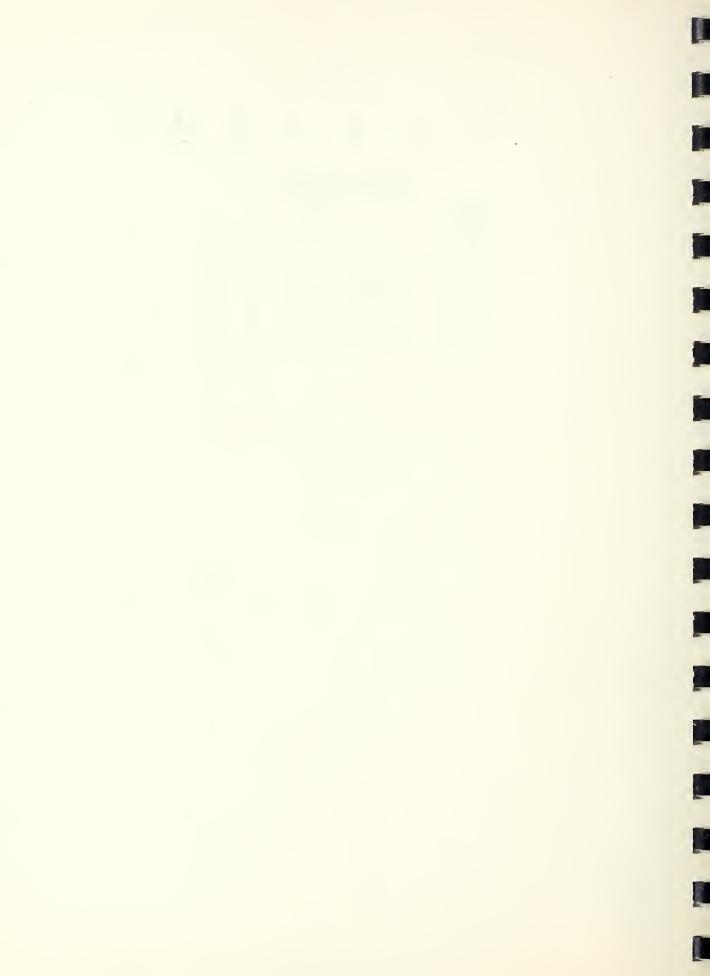
2 groups; each contains 5 replications; Extended Youden Square

Rep.	Blk.		Tr.		Rep.	Blk.		Tr.	,	
I	1234567890123456789012345678901 (1234567890123456789012345678901 (1111111112222222223333333333345678901	1234567890123456789 112345678901233456789 1123456789012333333333333333333333333333333333333	18 19 19 19 19 19 19 19 19 19 19 19 19 19	33344 112345678901234567890123456 11111111112222222222333333333333333333	II	2345678901200000000000000000000000000000000000	12345678 901	3901234567890123456789012345678 1111111111222222222222222222222222222	33 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	10073 901123 456 78 90123456 78 90123456 78 901234



36. k b v r  $\lambda$  6 7 7 6 5

Blk.			Tr	•		
(1) (2) (3) (4) (5) (6) (7)	1234567	2345671	3456712	4567123	5671234	6712345



#### CORRECTION

In the designs which are divided into groups, Roman numbers have been used to indicate the groups. The caption of this column has been mislabelled "Rep.," instead of the correct "Group." For example, the design with reference number 2, which has two groups, should appear as follows:

Group	Blk.	<u>Tr.</u>
I	(1) (2) (3) (4) (5)	1 2 5 4 1 3 4 5 3 4 5 3 4 5 3 4 5 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
II	(6) (7) (8) (9) (10)	1 3 4 2 5 1

No confusion will arise by observing that such designs carry a brief description, in which the number of groups is specified.

Some other designs, such as the design with reference number 1, are divided into replications, and hence the caption "Rep." is correct for them.



Blk.			Tr	•		
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11)	234567891011	34567890 1112	456 78 90 11 12 3	8 9 10 11 2 3 4 5 6 7	10 11 12 34 56 78 9	11 12 34 56 78 910



38. k b v r  $\lambda$  5

4 groups; each contains 2 replications, which are separable

Rep.	Blk.			1	r.		
I	(1) (2) (3)	1 4 7	258	3 6 9	7 1 4	8 2 5	9 3 6
II	(4) (5) (6)	1 2 3	456	7 8 9	2 3 1	5 6 4	8 9 7
III	(7) (8) (9)	1 2 3	6 4 5	8 9 7	3 1 2	5 6 4	7 8 9
IV	(10) (11) (12)	2 3	564	9 7 8	3 1 2	456	8 9 7



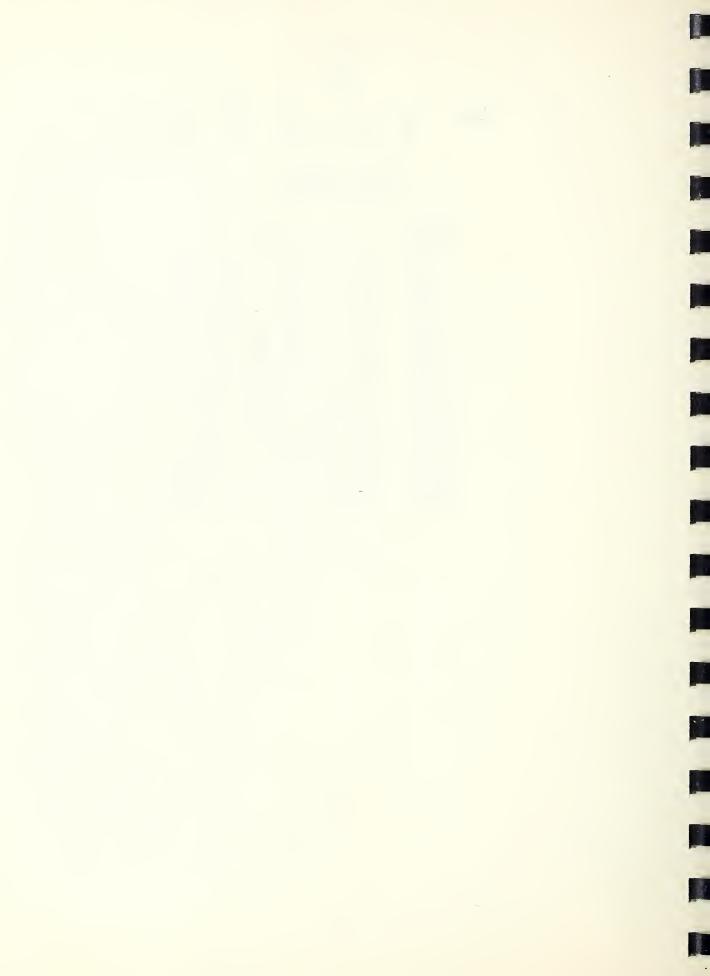
39.	k	ъ	v	r	ゝ
	6	15	10	9	5

Blk.			Tr	0		
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13) (15)	3221113211112	443452533222234	655675644433345	776786785676456	988899899887567	10 10 9 10 10 10 10 10 7 8 9



40. k b v r \(\lambda\) 6 16 16 6 2

Blk.	Tr.								
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13) (14) (15) (16)	12345678910112 131456	234167850112945613	3412785611290516314	5678910112 1314561234	12 9 10 11 16 13 14 12 38 56 7	13 14 15 16 12 3 4 5 6 7 8 9 10 11 12			



41.	k	ъ	V	r	λ
,	6	24	16	9	3

3 groups; each contains 3 replications, which are separable.

Rep.	Blk.			Tr	O manage		
I	(1) (2) (3) (4) (6) (7) (8)	1 3 7 9 11 13	2 4 6 8 10 12 14 16	5 7 9 11 15 13 1 3	6 8 10 12 16 14 2 4	11 9 13 15 1 3 7 5	12 10 14 16 2 4 8 6
II	(9) (10) (11) (12) (13) (14) (15) (16)	12569 1013 14	3 47 8 11 12 15 16	6 5 13 14 2 1 10 9	8 7 15 16 4 3 12 11	13 14 9 10 6 5 2	15 16 11 12 8 7 4 3
III	(17) (18) (19) (20) (21) (22) (23) (24)	1 2 5 6 9 10 13 14	4 3 8 7 12 11 16 15	5 6 9 13 1 14 10 2	8 7 12 16 15 13	10 9 13 1 14 6 2 5	11 12 16 45 738



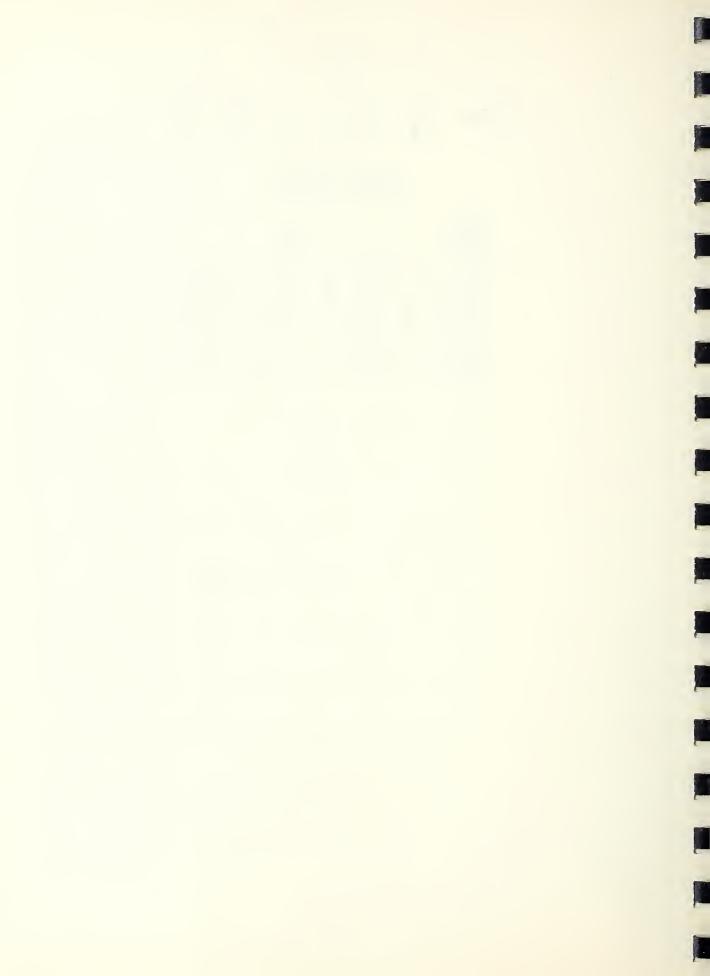
42. k b v r \(\lambda\) 6 31 31 6 1

Blk.			Tr	0		
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	123456789012345678901	2234798451430776512053189916860	378 9571834206987420261451065931 20121212121223451065931	4787003512612699890345121863574 218700351261269989034512181863574	57390642885993400516267131712148	26 127 145 18 20 16 172 18 13 19 19 22 25 21 21 21 21 21 21 21 21 21 21 21 21 21



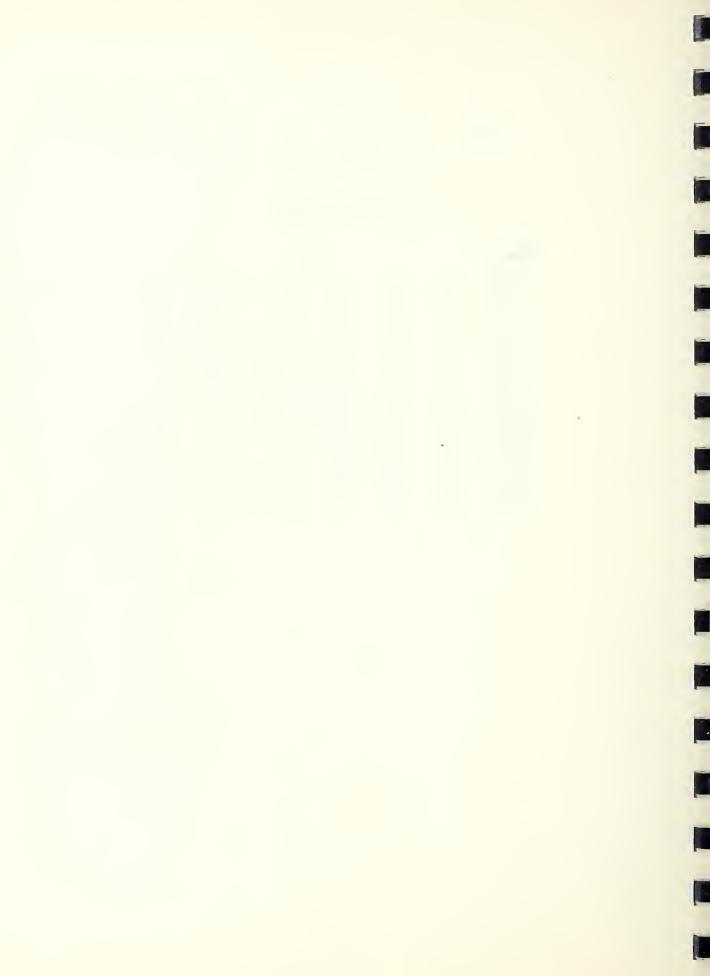
43. k b v r  $\lambda$  7 8 8 7 6

Blk.				Tr.			
(1) (2) (3) (4) (5) (6) (7) (8)	12345678	23456781	34567812	45678123	56781234	67812345	78123456

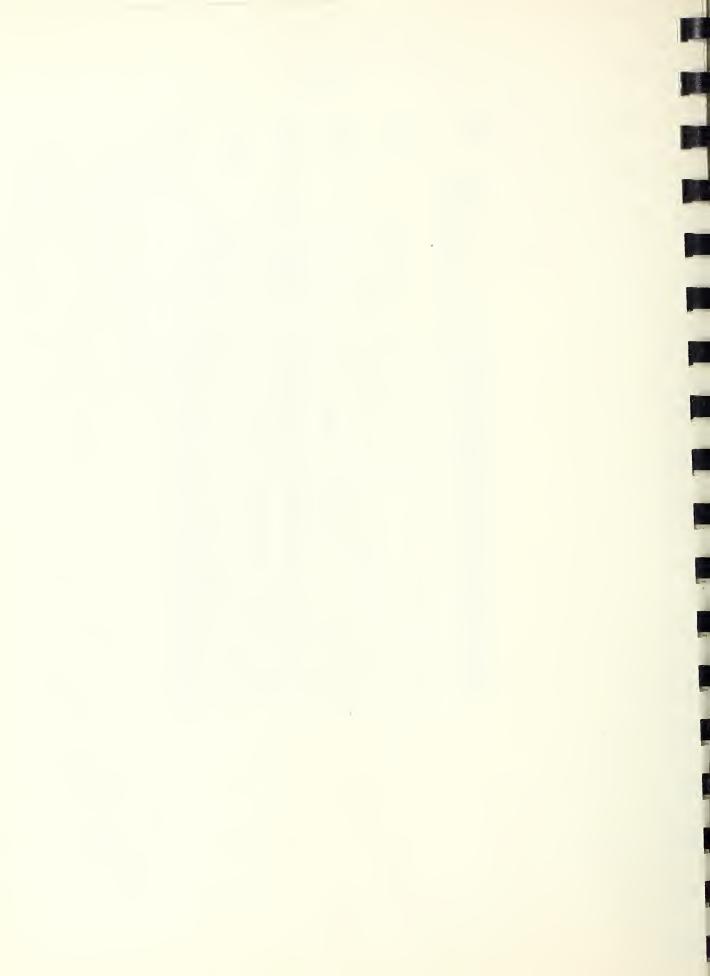


44.	k	ъ	٧	r	λ
111	7	15	15	7	λ 3

Blk.				Tr.			
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15)	1 2 3 4 5 6 7 8 9 0 11 2 13 14 5 15	2345678901123451	34567890112314512	56 78 90 11 12 3 14 15 1 2 3 4	6789112345 12345 12345	901123145678 112345678	11 12 13 14 15 1 2 3 4 5 6 7 8 9 10



45.	k 7	ъ 30		v 21	r 10		3
Blk.				Tr.	•		
(1) (23) (45) (12) (12) (13) (14) (13) (14) (15) (18) (18) (18) (18) (18) (18) (18) (18	123435123415323455111123455161	581204485902734787923234912272	706976729066560634806475690383	934518851234394512518788306494	134511211896967128969671290447505	18 19 6 7 19 6 17 18 8 13 19 6 17 18 8 13 19 6 17 18 8 13 14 11 15 5 0 0 0	19 16 17 18 18 20 20 20 20 20 21 21 21 21 21 21 21 21 21 21 21 21 21



2		845172347567890123845678945012934567 222 2 2 122222
		222222222222222222222222222222222222222
9		2222835507283152348567899011334456899
₹ 28	Tr.	1456799423145648623015678347267890783
		567850189012374977892132563586718124
ъ 36		234346767890123565678904212454567231
k 7		112234556789012344567891001233456788
46.	Blk.	((((((((((((((((((((((((((((((((((((((



# 47. k b v r \(\lambda\) 7 56 49 8 1

# 8 Replications

Rep.	Blk.	Tro	Rep.	Blk.	Tr o
T	(1) (2) (3) (4) (5) (6) (7)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49	V	(29) (30) (31) (32) (33) (34) (35)	1 12 16 27 31 42 46 2 13 17 28 32 36 47 3 14 18 22 33 37 48 4 8 19 23 34 38 49 5 9 20 24 35 39 43 6 10 21 25 29 40 44 7 11 15 26 30 41 45
II	(8) (9) (10) (11) (12) (13) (14)	1 8 15 22 29 36 43 2 9 16 23 30 37 44 3 10 17 24 31 38 45 4 11 18 25 32 39 46 5 12 19 26 33 40 47 6 13 20 27 34 41 48 7 14 21 28 35 42 49	VI	(36) (37) (38) (39) (40) (41) (42)	1 11 21 24 34 37 47 2 12 15 25 35 38 48 3 13 16 26 29 39 49 4 14 17 27 30 40 43 5 8 18 28 31 41 44 6 9 19 22 32 42 45 7 10 20 23 33 36 46
III	(15) (16) (17) (18) (19) (20) (21)	1 14 20 26 32 38 44 2 8 21 27 33 39 45 3 9 15 28 34 40 46 4 10 16 22 35 41 47 5 11 17 23 29 42 48 6 12 18 24 30 36 49 7 13 19 25 31 37 43	VII	(43) (44) (45) (46) (47) (48) (49)	1 10 19 28 30 39 48 2 11 20 22 31 40 49 3 12 21 23 32 41 43 4 13 15 24 33 42 44 5 14 16 25 34 36 45 6 8 17 26 35 37 46 7 9 18 27 29 38 47
IV	(22) (23) (25) (26) (27) (28)	1 13 18 23 35 40 45 2 14 19 24 29 41 46 3 8 20 25 30 42 47 4 9 21 26 31 36 48 5 10 15 27 32 37 49 6 11 16 28 33 38 43 7 12 17 22 34 39 44	VIII	(51) (552) (553456) (556)	1 9 17 25 33 41 49 2 10 18 26 34 42 43 3 11 19 27 35 36 44 4 12 20 28 29 37 45 5 13 21 22 30 38 45 6 14 15 23 31 39 47 7 8 16 24 32 40 48



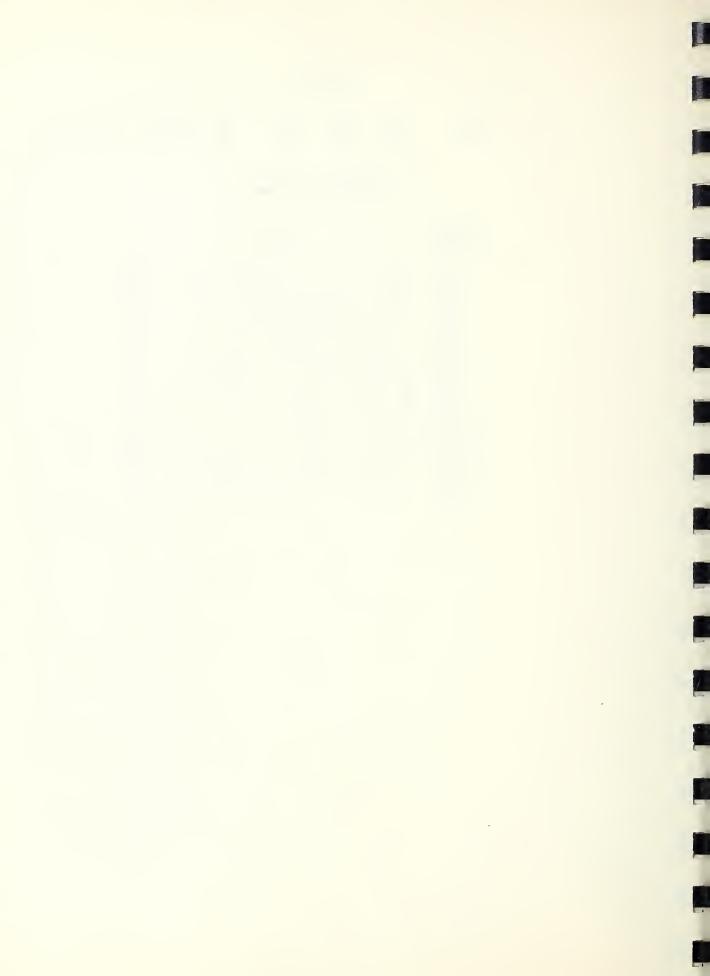
48.	k	Ъ	v	r	2
	8	9	9	8	7

Blk.	Tr							
(1) (2) (3) (4) (5) (6) (7) (8) (9)	123456789	234567891	345678912	456789123	567891234	678912345	789123456	8 9 1 2 3 4 5 6 7



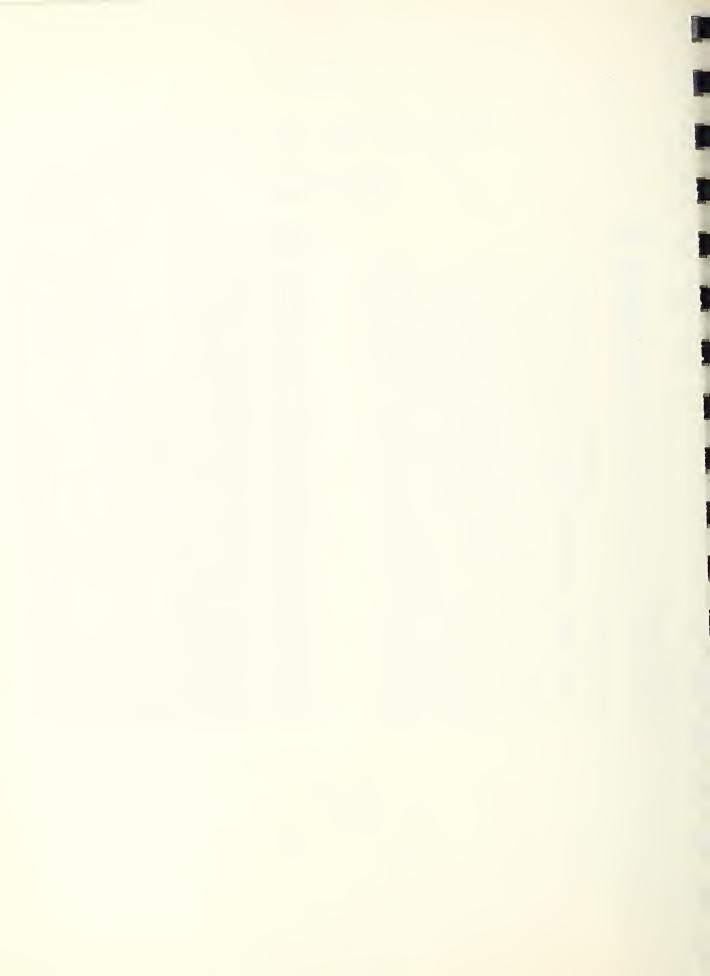
49. k b v r \(\lambda\)
8 15 15 8 4

Blk.				Tr	•			
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13) (14) (15)	456789011213145123	78 9 10 12 13 14 5 1 2 3 4 5 6	8 9 10 12 13 14 15 1 2 3 4 5 6 7	10 11 12 13 14 15 12 3 4 5 6 7 8 9	12 13 14 15 12 3 45 6 7 8 9 10 11	13 14 15 12 3 45 6 78 9 0 11 12	14 15 12 34 56 78 90 11 23	15 12 34 56 78 90 11 12 13 14



50. k b v r \ \ 8 57 57 8 1

Blk.		Blk.
((((((((((((((((((((((((((((((((((((((	1 2 3 4 5 6 7 50 2 51 16 23 31 38 45 17 4 11 18 51 32 39 46 25 5 12 19 26 51 40 33 47 6 13 20 27 34 51 49 51 7 14 21 28 35 44 52 46 13 20 27 34 51 47 8 9 10 11 12 14 50 13 10 52 28 35 44 52 46 11 17 23 30 36 49 51 12 18 52 31 37 43 52 13 19 26 32 38 53 11 20 26 32 38 15 14 20 26 32 38 12 15 16 28 33 12 16 33 35 40 45 20 17 18 53 34 12 18 53 34 12 18 53 35 40 45 20 25 53 36 48 21 36 53 29 41 20 25 53 36 48 21 36 53 29 41 20 25 54 31 21 26 54 41 22 23 34 35 40 24 35 39 44 25 29 30 31 26 54 41 27 31 54 42 28 32 36 47 28 32 33 30 31	(30) 30 40 43 55 14 17 27 4 (31) 31 41 44 5 8 18 55 28 (32) 32 42 55 6 9 19 22 45 (33) 33 36 46 7 55 20 23 10 (34) 34 55 47 1 11 21 37 24 (35) 35 38 48 2 15 55 25 12 (36) 36 37 50 39 40 41 42 38 (37) 37 46 6 8 17 26 35 56 (38) 38 47 7 9 18 56 29 27 (39) 39 48 1 19 10 28 56 30 (40) 40 49 2 56 20 22 11 33 (41) 41 56 12 43 21 23 33 (42) 42 44 4 13 56 24 15 33 (43) 43 50 45 46 47 48 44 49 (44) 44 5 12 57 20 28 29 12 37 (46) 46 5 13 21 57 30 38 22 (47) 47 6 14 15 23 31 57 39 (46) 46 5 13 21 57 32 40 (47) 47 6 14 15 23 31 57 39 (48) 48 7 8 16 24 57 32 40 (49) 49 1 9 17 25 33 41 57 (50) 50 57 56 52 22 29 36 43 1 (52) 52 21 27 33 39 45 2 8 (53) 53 27 32 37 49 5 10 15 (54) 54 33 37 48 22 3 14 18 (55) 55 39 49 3 13 16 26 29 (56) 56 45 5 14 16 25 36 34 (57) 57 43 42 10 26 34 18



#### 9 Replications

Rep.	Blk.	31k. Tr.					Rep. Blk. Tr.												
Ī	(12) (23) (345) (678) (78)	1 9 17 25 33 41 49 57	201864208 1824508	3 11 19 27 35 45 59	12 20 28 36 44 52 60	53 21 29 37 45 31	6 14 22 30 38 45 54 62	7 15 23 31 39 45 63	8 16 24 32 40 48 56 64	V	(33) (34) (35) (36) (37) (38) (39) (40)	12345678	15 16 13 14 11 12 9	21 22 23 24 17 18 19 20	27 28 25 26 31 32 29 30	40 38 37 35 34 33	42 44 44 43 65 87	5555455555	62 61 64 65 55 69
İI	(9) (10) (11) (12) (13) (14) (15) (16)	12345678	9 10 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32	33 34 35 36 37 38 39 40	41 42 43 44 45 46 48	490123456	57 58 59 60 61 62 63 64	VI	(41) (42) (43) (44) (45) (46) (47) (48)	12345678	16 15 14 12 11 10 9	23 24 21 22 19 20 17 18	26 25 28 27 30 29 31	36 35 33 33 40 38 37	456 447 441 441 444 444 444 444 444 444 444	543650 55555451	5655634 662
ΙΊΙ	(17) (18) (19) (20) (21) (22) (23) (24)	12745678	10 9 12 11 14 13 16 15	19 20 17 23 24 21 22	28 27 26 25 33 30 29	37 38 39 40 33 45 36	46 58 72 44 43	55555545	64 632 60 65557	VII	(49) (50) (51) (52) (534) (554) (56)	12345678	12 10 16 15 14 13	24 23 22 20 18 17	29 30 31 32 25 26 27 28	38 37 40 39 33 36 35	47 48 45 44 44 44 44 44 44 44 44 44 44 44 44	554555555	58 550 550 61 64 63
IV	(25) (26) (27) (28) (29) (30) (31) (32)	12345678	13 14 15 16 9 10 11 12	18 17 20 19 22 21 24 23	30 29 32 31 26 25 28 27	39 40 33 33 33 34	43 441 442 448 446	555555554	60 558 57 64 62 61	VIII	(57) (58) (59) (60) (61) (62) (63) (64)	12345678	14 13 16 15 10 12 11	20 19 18 17 24 23 22 21	31 32 30 27 28 25 26	35 36 33 39 40 38	48 47 44 44 44 44 41	54555555555555555555555555555555555555	61 62 64 64 55 55 60
					Re	p.	Bll	20		6	r.								
					IX		(65) (66) (67) (72) (73)		1 11 2 12 3 9 4 10 5 15 6 16 7 13 8 14	22 32 21 33 24 30 23 20 18 20 17 2° 20 20 19 29	2 34 4 1 33 4 1 36 4 9 35 4 9 37 4 7 40 4 4 4 5 39	43218765	55 6	3 4 2 5 9 0 7 8 8					



52. k b v r 2 8

Blk.					Tr.				
(1) (2) (3) (4) (5) (6) (7) (8) (10)	1234567890	2345678901	3456789012	4567890123	5678901234	6789012345	78 90 12 3 4 5 6	8 9 10 12 3 4 5 6 7	9012345678



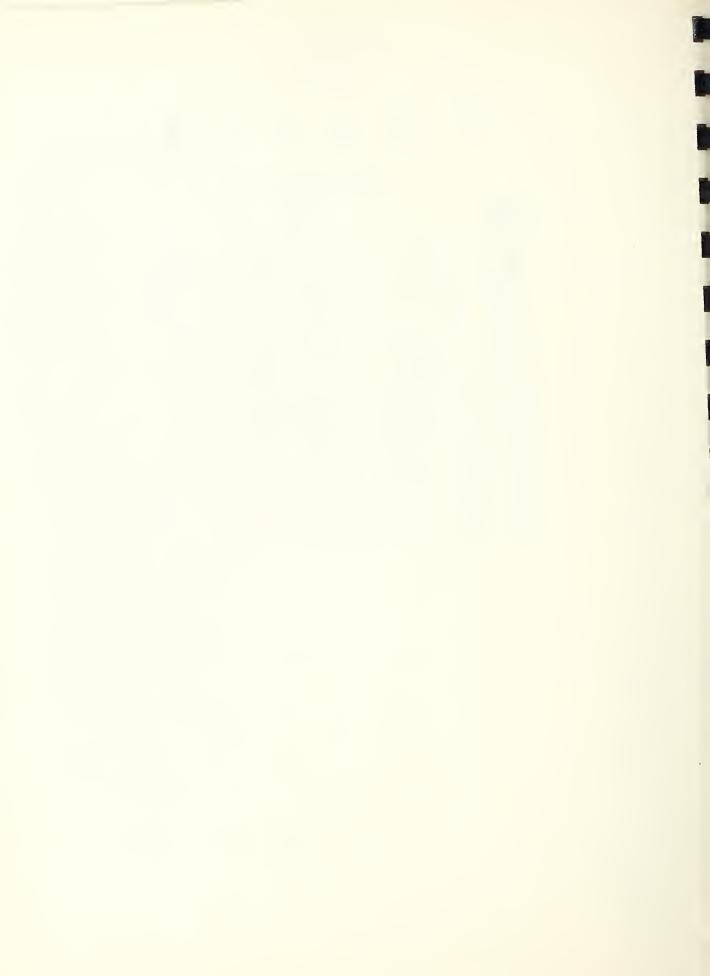
53. k b v r  $\lambda$  9 13 13 9 6

Blk.					Tr.				
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13)	1234567891011213	3756 1190 128 131 42	13 12 13 12 56 7 3 9 10 8 11	512910 131274638	8 13 11 6 2 3 4 1 5 7 10 9	98671 10123523114	10 9 11 8 2 12 13 14 35 76	11 13 12 93 45 27 86 10	12 3 45 7 8 9 10 6 11 13 2 1



54. k b v r 2 4

Blk.					Tr.	•			
(1) (2) (3) (4) (5) (6) (7) (8) (10) (12) (12) (13) (14) (15) (16) (17) (18) (19)	123456789011213456171819	34567890112 112145678 10121145678 10121145678	5678 90 112 345 678 91 2 34 112 345 678 91 2 34	678 90 112 145 167 18 91 2 3 45	78 9 10 11 2 13 14 15 6 17 18 19 1 2 3 4 5 6	8 9 10 11 2 13 14 5 6 7 18 19 12 3 4 5 6 7	11 12 13 14 15 16 17 18 19 12 34 56 78 90	14 15 16 17 18 19 12 3 4 5 6 7 8 9 9 10 11 12 3	15 16 17 18 19 12 3 4 5 6 7 8 9 10 11 12 13 14



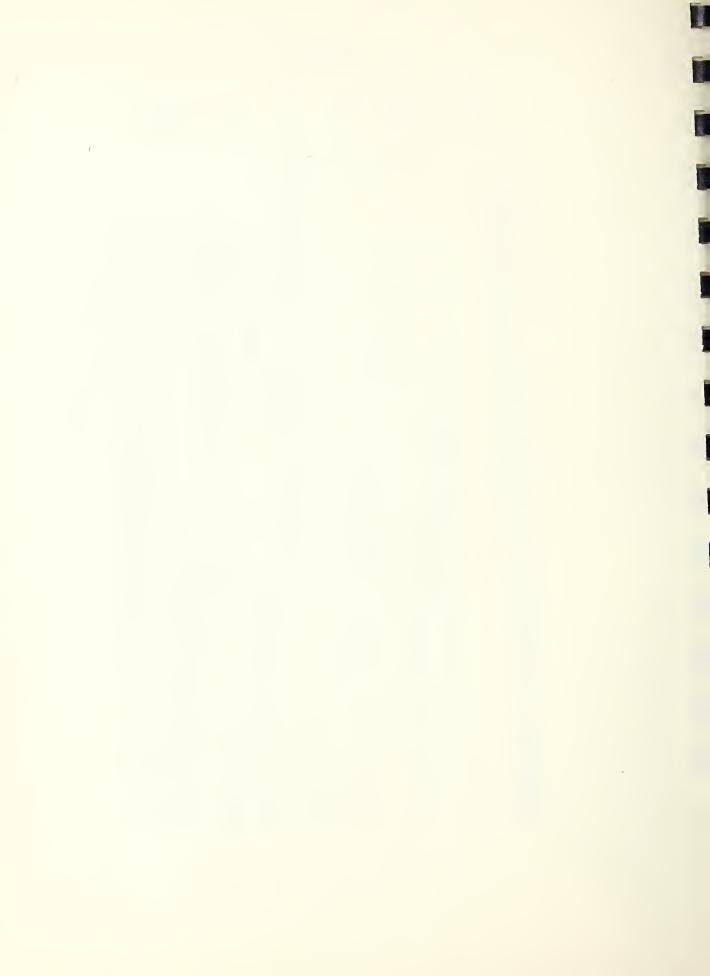
55. k b v r A 9 25 25 9 3

Blk.					Tr.				
(1) (2) (3) (4) (5) (78) (10) (12) (12) (14) (15) (18) (18) (18) (18) (18) (18) (18) (18	12345678901121456789012345 112345678901232222	2442586103986130749752153 222186139861307497521253	39857125120490471813231664215	4038832652459717045619321 122897717045619321	548 28 136 26 10 73 11 14 13 19 59 45 22 17 22 17	6721211402321855793804 122211402321855793804 12491164	7513124531850449162368179	82433551125926312074487906	9210190153172 <b>215</b> 32241678881611435



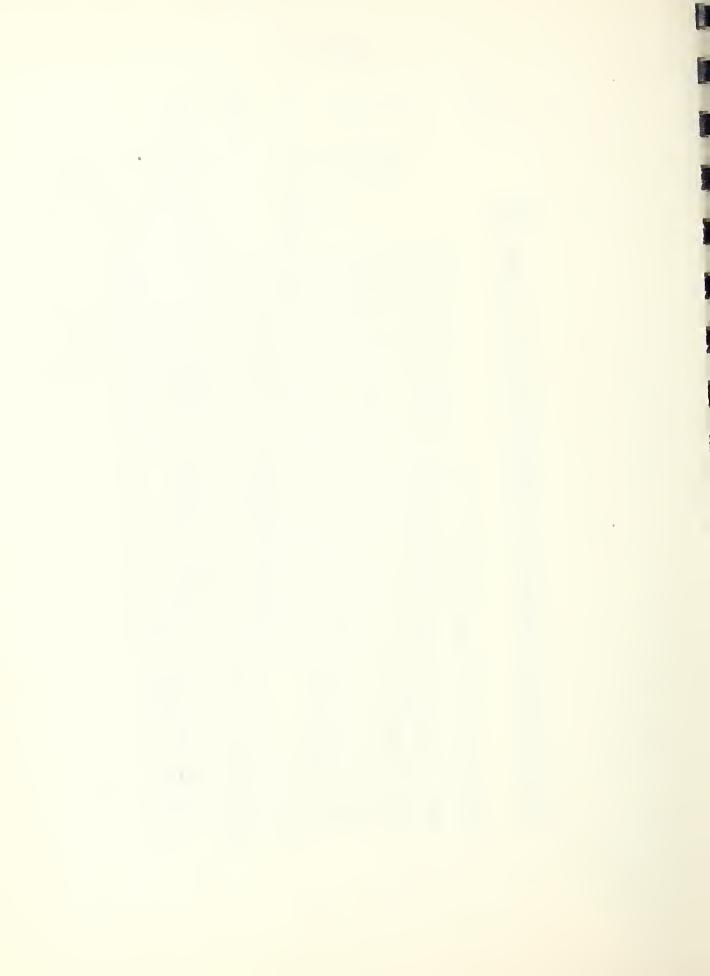
56. k b v r λ
9 37 37 9 2

Blk.					Tr.				
(1) (2) (4) (4) (6) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	123456789012345678901234567	2345678901234567890123456789012345671	456789012345678901234567123 111111111122222222233333333333	8 9 0 1 1 2 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2	1901234567890123456712345678901234567	222223333333333333333333333333333333333	2222333333333 3 1234567890123456789012345 11111111112222222	33333333333333333333333333333333333333	331234567890123456789012345 111111111122222222223333333



57. k b v r \(\lambda\)
9 73 73 9 1

Blk.					Tr.				
(12) (12) (12) (145) (11) (11) (11) (12) (12) (12) (12) (13) (13) (13) (13) (13) (13) (13) (13	1234567890123456789012345678901234567	2612345609774321801258786709936547654	3860123418571290988766437921876557341	46769012210943750321487658991436564092	5456789036781237168412909329098753218	62945678555555542655666634 637113	7012346667869078514865821451901291330	803812364444367643935143675426909876009	658906665457127587436309212412497608568 211113122361608568



# 57. (Cont'd)

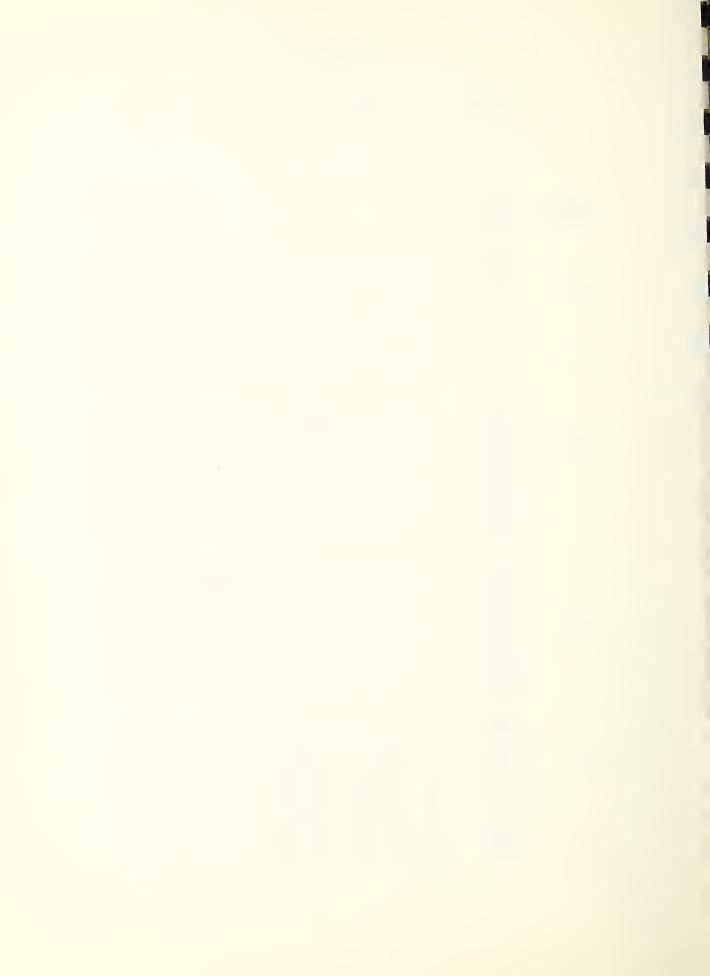
Blk.				T	r.				
(3890) (3890) (3901) (4444444455555567890) (4444567890) (5555567890) (666667890) (7773)	3344444444455555555555566666666667777	4701245691120143870958563413290988327 223456	295332100815142698794569032076045423 541119132076045423	64358563117285416901209874322358408737	76 747 165 165 165 163 163 163 163 163 163 163 163 163 163	1112670614436429871529373333364 5 1134	1709785122905543028755832143993233766 1721422723235533 473364474444646 132346	345413345 53347 21573452127521224451	70 90 85 191 98 71 23 44 44 44 45 45 45 45 55 55 56 56 56 56 56 56 56 5



58。	k	ъ	V	r	λ
	9	90	81	10	1

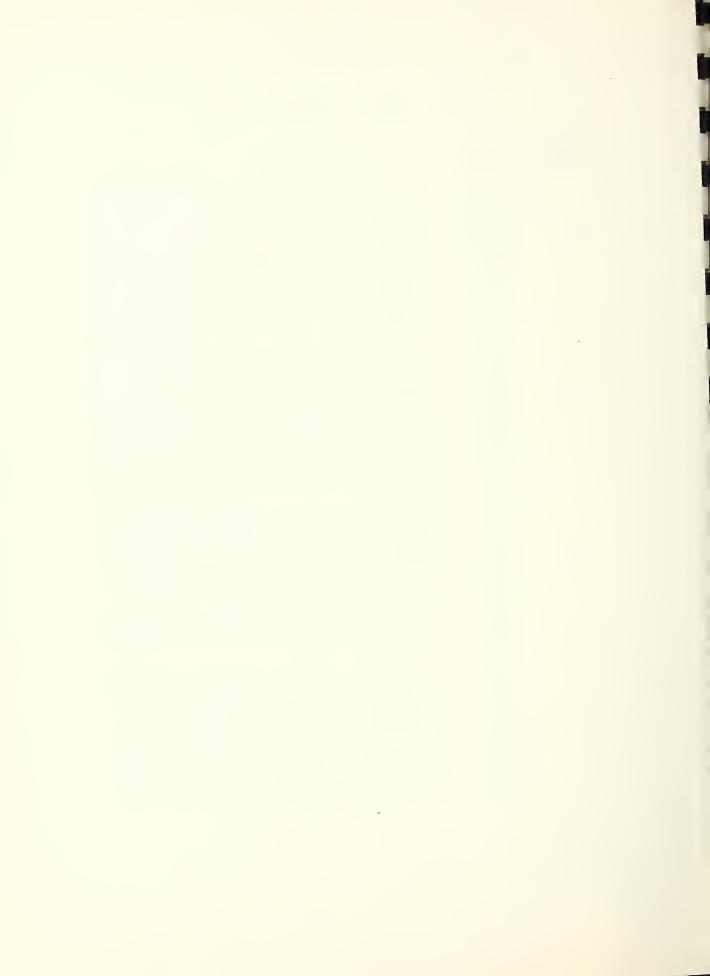
# 10 Replications

Rep.	Blk.					Tr.	,			
I	(1) (2) (3) (4) (5) (6) (7) (8)	1 10 19 28 37 46 56 47 73	2 11 20 29 38 45 65 74	3 12 21 30 39 48 57 66 75	13 22 31 49 56 76	5 14 23 32 41 50 59 68 77	65432 4560 78	7 16 25 34 43 561 70 79	8 17 26 35 44 53 62 71 80	9 18 27 36 45 45 45 72 81
II	(10) (11) (12) (13) (14) (15) (16) (17) (18)	123456789	10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27	28 29 30 31 32 33 34 36	37 38 39 41 42 44 45	46 47 49 45 55 55 55 55	556789061 61623	64 65 66 67 68 69 70 71 72	73 74 75 76 77 78 79 80 81
III	(19) (20) (21) (22) (23) (24) (25) (26) (27)	123456789	12 10 11 15 13 14 16 17	20 21 29 23 24 22 26 27 25	34 35 36 28 29 33 32 33 33 33	45 443 44 37 38 40 41	53427846019	58 90 61 2 63 55 6 7 55 55 57	69 67 68 72 70 71 66 64 65	77 78 76 80 81 79 74 75
IA	(28) (29) (30) (31) (32) (33) (34) (35) (36)	123456789	13 14 15 16 17 18 10 11 12	25 26 27 19 20 21 22 23 24	30 28 29 33 32 33 36 34 35	42 40 41 43 43 43 43 73 8	555446 45190	56 57 55 59 60 58 61	68 69 67 71 72 70 65 64	80 81 79 74 75 73 77 78 76



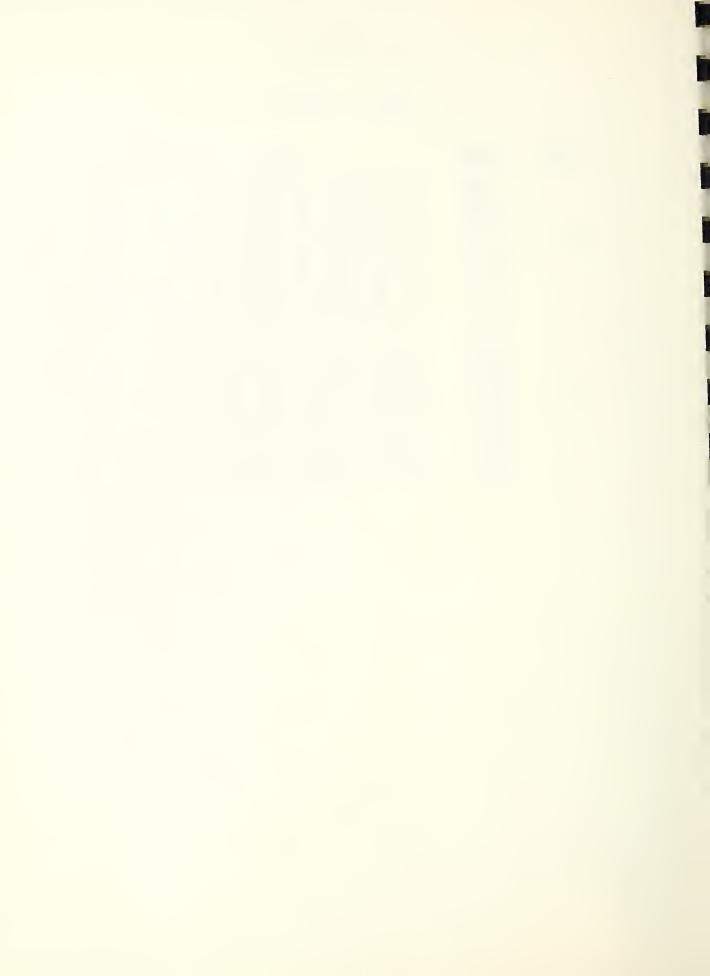
58. (Cont'd)

Rep.	Blk.					Tr.				
V	(37) (38) (39) (40) (41) (42) (43) (44) (45)	123456789	14 15 13 17 18 16 11 12	27 25 26 21 19 20 24 22 23	35 36 34 29 30 28 32 33 31	39 37 38 40 41 45 44 44	4901234678 478	60 58 59 61 62 55 56	70 71 72 64 65 66 67 69	74 75 73 77 78 76 80 81 79
VI	(46) (47) (48) (49) (51) (52) (53) (54)	123456789	15 13 14 18 16 17 12 10 11	26 27 25 20 21 19 23 24 22	32 33 31 35 36 34 29 30 28	43 44 45 37 38 39 41 42	48 44 47 19 19 19 19 19 19 19 19 19 19 19 19 19	63 62 57 55 60 55 55 60 55 55	65 66 68 69 67 71 72 70	76 77 78 79 80 81 73 74 75
VII	(55) (56) (57) (58) (59) (61) (62) (63)	123456789	11 12 10 14 15 13 17 18 16	21 19 20 24 22 23 27 26	31 32 33 34 35 38 29 30	41 42 44 45 43 43 33 37	51 49 50 55 55 55 54 46 47	61 62 63 55 67 89 60	71 72 70 65 64 68 69 67	81 79 80 75 73 74 78 76 77
VIII	(64) (65) (66) (67) (68) (69) (70) (71) (72)	123456789	16 17 18 10 11 12 13 14 15	22 23 25 25 27 20 21	29 30 28 32 33 31 35 34	44 45 43 38 37 41 40	554555444 55554446	55560893362	72 70 71 66 64 65 67 68	78 76 77 81 79 80 75 73 74



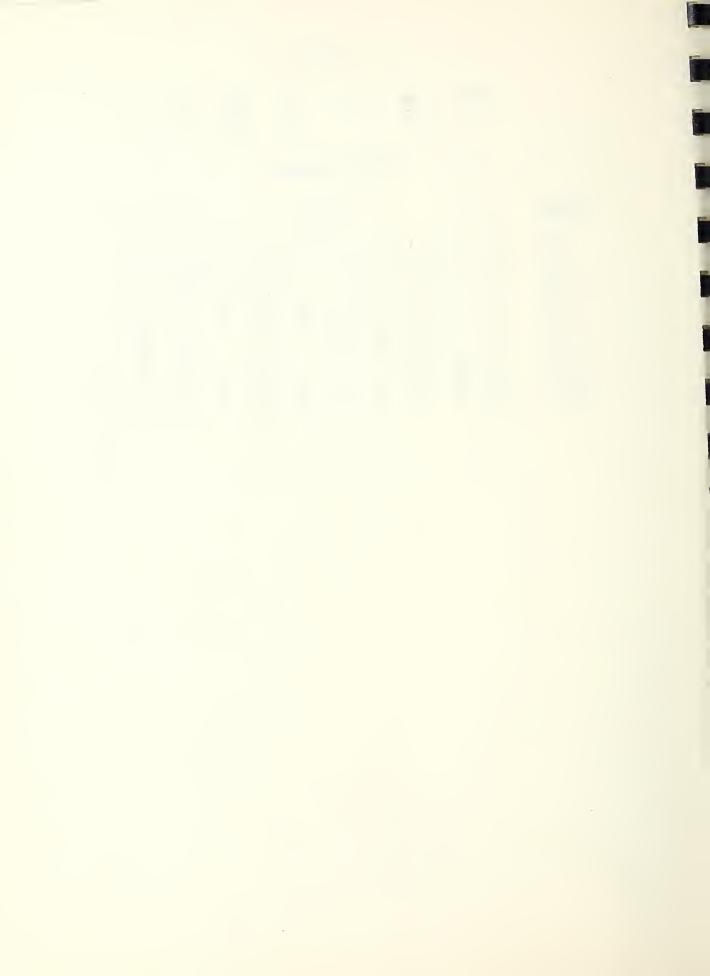
58 . (Cont'd)

Rep.	Blk.	Tr.										
IX	(73) (74) (75) (76) (77) (78) (79) (80) (81)	123456789	18 16 17 12 10 11 15 13 14	23 24 22 26 27 25 20 21	33 31 32 36 34 35 38 29	38 39 37 42 44 45 43	55544449 555444455	62 63 61 55 55 55 60 58	67 68 69 70 71 72 65 66	75 73 74 78 76 77 81 <b>79</b>		
X	(82) (83) (84) (85) (86) (87) (88) (89) (90)	123456789	17 18 16 11 12 10 14 15 13	24 22 23 27 25 21 20	36 34 35 30 28 29 33 31 32	40 41 42 44 45 73 89	486019342 4554555	59 60 58 62 63 61 65 55 55	66 64 65 67 68 70 71	79 80 81 73 74 75 76 77		



59. k b v r 3

Blk.					Tr	0				
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)	1 2 3 4 5 6 7 8 9 0 11	2345678910111	345678910112	4567891011123	56 78 90 11 12 34	6789101112345	78 9 10 11 12 3 4 5 6	8 9 10 11 12 3 4 5 6 7	9 10 11 12 34 56 78	10 11 12 34 56 78 9



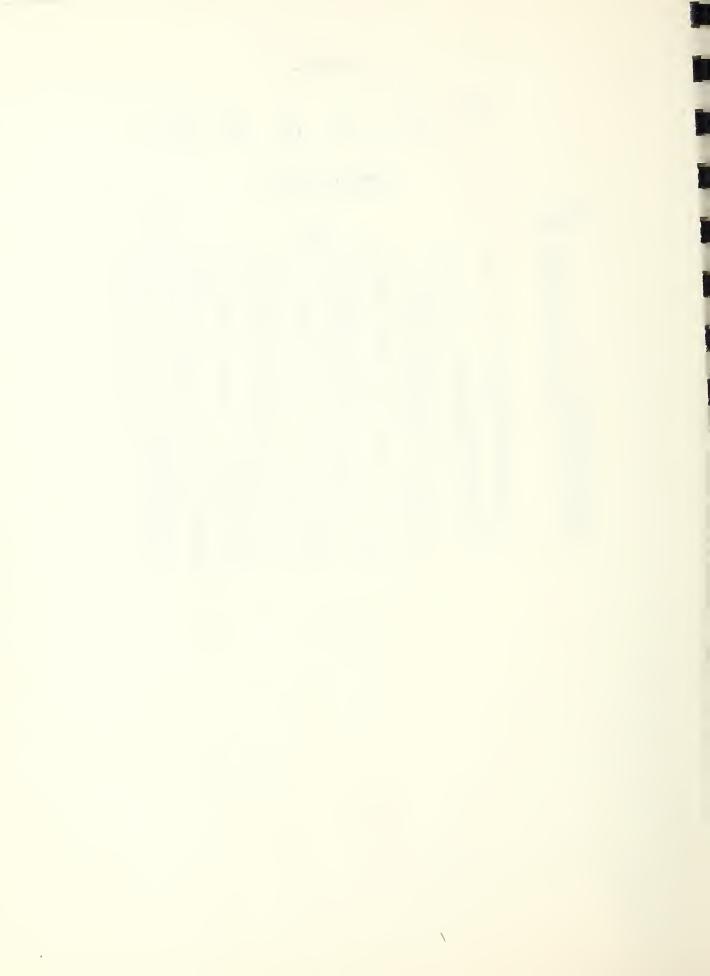
60. k b v r \ \ 10 16 16 10 6

Blk.					T	r.				
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (13) (14) (15) (16)	12345678901123456	34567890112345612	45678901123456123	67890112345612345	78 9 10 11 23 14 15 6 1 2 3 4 5 6	8 9 10 11 2 3 4 5 6 7 11 2 3 4 5 6 7	9 10 11 12 13 14 15 12 12 16 56 74	11 12 14 15 16 52 34 96 78 13 10	12 15 15 15 16 16 10 17 18 13 14 11	13 14 15 16 12 34 56 78 90 11 12



61. k b v r  $\lambda$  10 19 10 5

Blk.					T	r.				
(1) (2) (3) (4) (5) (6) (7) (8) (10) (11) (12) (12) (14) (15) (16) (17) (18)	123456789011213456171819	34567890112145678912	8 9 10 12 3 14 5 6 7 12 3 4 5 6 7	90112345678 112345678 112345678	11 12 13 14 15 16 17 18 19 12 3 4 5 6 7 8 9 10	12 13 14 15 16 17 18 19 12 34 56 78 90 11	15 16 17 18 19 12 34 56 78 90 11 12 14	16 17 18 19 12 34 56 78 90 11 12 13 14 15	17 18 19 12 34 56 78 90 11 12 13 14 56	18 19 12 34 56 78 90 11 12 34 15 16 17



62. k b v r  $\lambda$  10 31 31 10 3

Blk.					<u>T</u>	r.				
(1) (2) (3) (45) (78) (112) (113) (1145) (1145) (118)	123456789012345678901	2345671123489045678231567890019	42071357482795668308011394516291 212795668308011394516291	8 9 0 1 1 2 6 4 5 9 9 6 3 8 2 5 0 7 1 2 3 4 7 8 1 7 1 5 4 6 3 0 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	9072348679901523056714561823418 12212213356714561823418	117318 90385095678204461234167529 12122211222314461234167529	15668 90 12345 4112348 90 56 78 223 1 70 7	16 19 18 14 10 11 12 17 17 16 17 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19	18 51 95 2 36 78 91 46 00 7 42 35 91 23 8 70 1 46 16 16 16 16 16 16 16 16 16 16 16 16 16	282234567123401567899112390 221567123401514890112323



63. k b v r \ \ \ 10 91 91 10 1

Blk.	Tr <sub>o</sub>										
(1234567890))))))))))))))))))))))))))))))))))))	123456789012345678901234567890123	234567890123456789012345678901234	78 9012345678 901245678 901	1234567890123456789012345678901234567890123	222223333333333344444444455555555556666666666	222333333333344444444455555555556666666666	333334444444444555555555556666666666677777777	444444455555555555666666666667777777777	5555556666666666677777777778888888888899	555566666666677777777777888888888899	

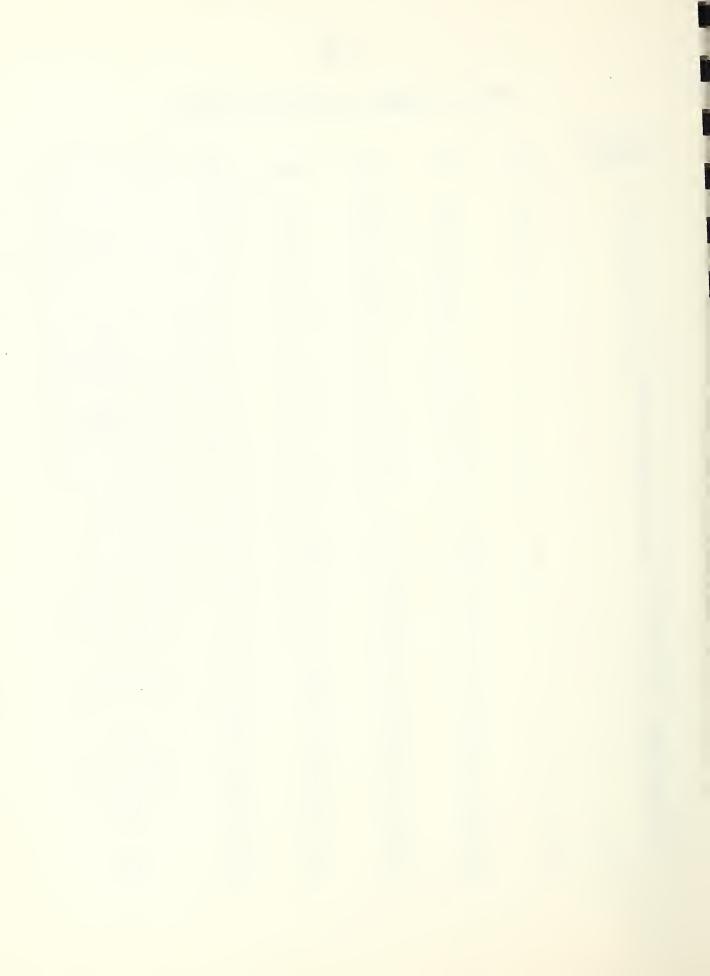


# 63. (Cont'd)



#### INDEX BY NUMBER OF UNITS IN A BLOCK

Reference number	(k)	(b)	(v)	(r)	()	Remarks
1234567890123456789012 1234567890123456789012 335678901	2222222223333333333333444444444455555555	6051865547002605705734558003618811027125648	4567890147569305915738609658619051517190661	34567890336546979044447068589550975606689698	11111111121321121121132133213623111425421111535523	R 2G:2;E.Y.S. R 3G:2;E.Y.S. R 4G:2;E.Y.S. Y.S. Y.S. 2G:3;E.Y.S. 3G:3;E.Y.S. R 2G:3;E.Y.S. R 2G:3;E.Y.S. R 2G:4;E.Y.S. Y.S. Y.S. Y.S. Y.S. Y.S. Y.S. Y.S



# INDEX (Cont'd)

Reference number	(k)	(b)	(v)	(r)	(2)	Remarks
42	6 6	3 <b>1</b> 69 85	31 46	6 9 <b>1</b> 0	1 1	Y.S.
43 44	7 7 7	8 15 22	8 15 22	7 7 7	6	Y.S. Y.S.
45 46	, 7 7	30 36 56	21 28		3 2	R
47 48 49	66777777888888899999999 <b>1</b> 0	31 958 12335 95957203 13	46 18 18 18 18 19 19 18 18 18 18 18 18 18 18 18 18 18 18 18	10 9 8 8 8	1116323217422118643211965321	Y.S. Y.S.
50 51	8 8 8	45 57 72	36 57 64	10 8 9 9 9 9 9 9	2 1 1	Y.S. R
52 53 54	9 9	10 13 19	10 13 19	9	8 6 4	Y.S. Y.S. Y.S.
50 55 55 55 55 55 55 55 55 56 56	9 9 9	19 25 37 73	19 25 37 73 81	9	3 2 1	Y.S. Y.S. Y.S. R
59 60	10 10 10	90 11 16 19	11 16 19	10 10 10	9 -	Y.S. Y.S.
61 62	10 10	31 46 91	31 46 91	10 10	3 2	Y.S. Y.S.
63	10	77	AT.	10	Τ	Y.S.



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